III

This is a suit in equity of which this Court has original jurisdiction. Equitable jurisdiction is claimed for the reason that the plaintiff is threatened with the invasion and denial of certain rights guaranteed to it by the Constitution of the United States and with imminent and irreparable injury, loss and damage, and the plaintiff is without an adequate and complete remedy at law therefor.

IV

Jurisdiction

The grounds upon which the jurisdiction of this Court is invoked and depends are as follows:

(a) This is a suit of a civil nature, in equity, between citizens of different States, as hereinbefore alleged.

(b) The amount in controversy herein, exclusive of interest and costs, exceeds the sum of three thousand dollars ($3,000).

[fol. 4] (c) This suit arises under the Constitution and Laws of the United States of America, for the reason that the enforcement against the plaintiff by the defendant of the provisions of a statute of the State of West Virginia, commonly known as the "West Virginia Gross Sales and Income Tax Law" (Article 13, Chapter 11, Official Code of West Virginia, 1931, and amendments thereto), in various particulars as hereinafter set forth, is violative of Article I, Section 8, Paragraph 3, of the Constitution of the United States of America, in that the enforcement of said statute would constitute the imposition by a State of a direct tax and burden on interstate commerce.

(d) Also, this suit arises under the Constitution and Laws of the United States of America, for the reason that the enforcement against the plaintiff by the defendant of said statute in various particulars as hereinafter set forth is violative of Article I, Section 8, Paragraph 3, of the Constitution of the United States, in that the enforcement of said statute would constitute the imposition of a direct tax and burden by a State upon the United States in the regulation, control, and improvement of the navigable

rivers, which power is incidental to the power to regulate commerce between the States and with foreign nations.

(e) Also, this suit arises under the Constitution and Laws of the United States of America, for the reason that the enforcement against the plaintiff by the defendant of said statute in various particulars as hereinafter set forth is violative of Article I, Section 8, Paragraph 17, of the Constitution of the United States, in that the enforcement [fol. 5] of said statute would constitute legislation by a State over property and places in respect of which the United States of America has exclusive legislative power and authority and the imposition of a State tax for the privilege of carrying on business within territory over which the United States of America has exclusive legislative power, and authority.

(f) Also, this suit arises under the Constitution and Laws of the United States of America, for the reason that the enforcement against the plaintiff by the defendant of said statute in various particulars as hereinafter set forth is violative of Section 1 of the Fourteenth Amendment to the Constitution of the United States, in that the enforcement of said statute would abridge the privileges or immunities of plaintiff as a citizen of the United States and would deprive the plaintiff of its property without due process of law and deny to it the equal protection of the laws.

V

This suit is brought for the purpose of enjoining and restraining the enforcement, operation, and execution against the plaintiff of the provisions of said Gross Sales and Income Tax Law and specifically to enjoin the defendant in his individual right and as State Tax Commissioner from collecting from the plaintiff, under color of the provisions of the said statute, the amount of money assessed against the plaintiff by the defendant and to secure a judgment or decree that said assessment is invalid.

The said Gross Sales and Income Tax Law of West Virginia is Article 13, Chapter 11, Code of West Virginia, 1931, and as amended May 26, 1933, effective May 27, 1933, and approved by the Governor. A true copy of said Act [fol. 6] as originally enacted and as subsequently amended is filed herewith, marked "Plaintiff's Exhibit No. 1," and made a part hereof.

VI

The Plaintiff

Upon information and belief:

The plaintiff, The Dravo Contracting Company, has been for many years and is now engaged in the general construction business with headquarters in the State of Pennsylvania. The operations of the plaintiff are conducted in various States throughout the United States, in addition to the State of Pennsylvania, and including the State of West Virginia. The said plaintiff has not had or maintained and does not now have or maintain any office or place of general business within the territorial boundaries of the State of West Virginia. The plaintiff, however, has been duly registered, qualified, and licensed under the laws of the State of West Virginia to do business in said State as a foreign corporation since the year 1922, and has paid annually all license taxes and fees required of it as such foreign corporation. The privilege taxes assessed against plaintiff, as hereinafter set forth, are in addition to all such license taxes. Plaintiff avers that it has annually, prior to the years 1933 and 1934, made return of its gross earnings to the Tax Commissioner of the State of West Virignia and has paid the gross sales tax thereon. During the years 1933 and 1934 the business transacted by plaintiff in the State of West Virginia consisted in part of ordinary intrastate business and in part of the performance of four contracts with the United States Government, hereinafter more particularly described. Plaintiff made return of its gross earnings from its intrastate business for the said years 1933 and 1934 to the Tax Commissioner of the State of West Virginia and paid the gross income tax upon said gross earnings. In said returns for the years 1933 and 1934, however, plaintiff stated upon the face thereof that the same did not include the proceeds derived from its contracts with the United States of America. Plaintiff ex- [fol. 7] cluded from its said returns the proceeds of its government contracts for the reason that plaintiff was advised by counsel and believed and does now believe and, therefore, avers that said Gross Sales and Income Tax Law of the State of West Virginia, in so far as it attempts to impose a tax upon the gross proceeds from plaintiff's government contracts, is unconstitutional and void.

VII

Upon information and belief:

That subsequent to the filing of plaintiff's gross sales and income tax returns for the years 1933 and 1934 in the manner above set forth, the defendant, Fred L. Fox, as State Tax Commissioner of the State of West Virginia, demanded that plaintiff include in its said returns the gross proceeds of plaintiff's contracts with the United States Government, but plaintiff refused so to do for the reasons hereinbefore stated. Thereupon the defendant demanded of plaintiff a statement of the amount of the gross proceeds derived by it from its government contracts for said years. Plaintiff by letters, expressly reserving its rights to contest the legality of said tax and its liability therefor, furnished said information, which is as follows:

Gross proceeds of income from United States Government contracts:

From January 1, 1933, to May 26, 1933	$701,591.99
From May 27, 1933, to December 31, 1933	$1,501,344.67
From January 1, 1934, to December 31, 1934	$4,431,525.63

all of which said sums were paid by the United States by checks or vouchers delivered to the plaintiff at Pittsburgh, Pennsylvania.

VIII

Upon information and belief:

The defendant, Fred L. Fox, State Tax Commissioner as aforesaid, purporting to act under the authority vested in him by the law of West Virginia aforesaid, has proceeded to make and has made an assessment against plaintiff for [fol. 8] the calendar years 1933 and 1934 upon the gross receipts of money received during that period by plaintiff from the United States of America, under the contracts hereinafter more particularly described, in the following amounts:

From January 1, 1933, to May 26, 1933:		
Gross	$2,092.78	
Penalties	774.33	
		$2,867.11
From May 27, 1933, to December 31, 1933:		
Gross	$30,011.89	
Penalties	6,302.50	
		36,314.39

From January 1, 1934, to December 31, 1934:

Gross	$88,605.51	
Penalties	7,974.50	
		96,580.01
		$135,761.51

And said Fred L. Fox, on the 15th day of July, 1935, notified plaintiff of said assessment and by letter further notified plaintiff that, unless said tax and penalties in the aggregate amount of $135,761.51, assessed by him on the gross receipts of plaintiff for the years 1933 and 1934, received from the United States of America under the said written contracts, was paid immediately, he, the said Fred L. Fox, would be forced to proceed in accordance with the law to collect the same and to distrain on the property of plaintiff to collect said tax. A copy of said letter and assessments from the defendant is herewith filed, marked "Plaintiff's Exhibit No. 2," and made a part hereof.

IX

Plaintiff avers that, as a part of its general construction business, it has been engaged for many years in the business of building and constructing locks and dams upon navigable rivers in the United States and in making, fabricating, and supplying the materials, and in furnishing the labor for the building and construction thereof. Plaintiff has owned for many years and now owns, maintains, and operates at Neville Island, in Allegheny County, in the State [fol. 9] of Pennsylvania, large industrial factories and mills for molding, shaping, and fabricating steel and other metal work, for testing and inspecting the same, and for the storage thereof. Plaintiff has kept and keeps employed a large number of workmen who are trained and skilled in the work of properly constructing locks and dams, and for a long time has owned, maintained, and operated equipment and machinery specially adapted to the construction of locks and dams.

X

During the years 1932 and 1933 plaintiff entered into four written contracts, hereinafter more specifically described, with the United States of America, to furnish all labor and materials and perform all work required for the construction of certain locks and dams for the improvement of navi-

gation and transportation on the Kanawha and Ohio Rivers.

Each of said four contracts was entered into and executed by plaintiff, The Dravo Contracting Company, at Neville Island, Pittsburgh, Pennsylvania. Said contracts were executed by and in behalf of the United States of America at Huntington, West Virginia, by the duly authorized agent and representative of the War Department of the United States of America, namely, the District Engineer of the United States Army, and were delivered to plaintiff by the United States of America at Pittsburgh, Pennsylvania. Said contracts are more particularly described as follows:

(a) A written contract dated August 30, 1932, between plaintiff and the United States of America, whereby plaintiff agreed to furnish all labor and materials and to perform all work required for the construction of a roller gate dam and for the installation of a permanent upper lock gate at the Marmet Lock and Dam in the Kanawha River in Kanawha County, West Virginia, near the Town of Marmet in said State, about nine miles above the City of Charleston and [fol. 10] sixty-eight miles above the junction of said Kanawha River and the Ohio River. In consideration of the furnishing of said materials and labor and the performance of said work, the United States of America agreed to pay the plaintiff a sum based on designations and unit rates specified in said contract, a true and correct copy of which, with specifications and schedules, is filed herewith, marked "Plaintiff's Exhibit No. 3," and made a part hereof.

(b) A written contract dated November 26, 1932, between plaintiff and the United States of America, whereby plaintiff agreed to furnish all labor and materials and to perform all work required for constructing a lock (Lock "B"), a roller gate dam, alterations to the upper miter gate of existing Lock "A", a power house on the river wall of Lock "A", and furnishing and installing the power house machinery, and lock illumination system, at London in Kanawha County, West Virginia, in consideration whereof the United States of America agreed to pay the plaintiff a sum based on designations and unit rates specified in the schedule appended to said contract, which contract and schedule are filed herewith, marked "Plaintiff's Exhibit No. 4", and made a part hereof.

(c) A written contract dated October 24, 1933, between plaintiff and the United States of America, whereby plaintiff agreed to furnish all labor and materials and to perform all work required to construct twin locks in the Kanawha River near the Town of Winfield in Putnam County, West Virginia, and, at the same place, a central control station on the river wall of Lock "A", and to furnish and install the central control station machinery, tow haulage units, and lock illumination and signal light systems, in consideration whereof the United States of America agreed to pay plaintiff a sum based on designations and unit prices specified in said contract, a copy of which is herewith filed, marked "Plaintiff's Exhibit No. 5", and made a part hereof.

[fol. 11] (d) A written contract dated December 21, 1933, between plaintiff and the United States of America, whereby plaintiff agreed to furnish all labor and materials and to perform all work required for constructing two parallel locks, including guide and guard walls, gates, and gate operating machinery, valves and valve operating machinery, and piping, in the Ohio River near the Town of Gallipolis, Ohio, but within the geographical boundaries of the State of West Virginia, in Mason County in said State, in consideration whereof the United States of America agreed to pay plaintiff a sum based on designations and unit prices specified in a schedule appended to said contract, which said contract and schedule are herewith filed, marked "Plaintiff's Exhibit No. 6," and made a part hereof.

XI

Upon information and belief:

The locks, dams, and appurtenant structures aforesaid, for which the plaintiff furnished the labor and materials under the contracts aforesaid, were built and constructed, and are being built and constructed under the direction and control of the United States, acting through the War Department thereof. The United States employed, placed and maintained in general charge of construction as aforesaid, a representative designated as the "Contracting Officer," and also at all times maintained at each of said places of construction a corps of civil engineers and representatives for the purpose of supervising, directing, and inspecting the building of said locks and dams

and appurtenant structures and for the purpose of inspecting and supervising the materials and the labor that went into the construction of same.

By the provisions of said contracts the United States retained and exercised power and authority to direct when the plaintiff should proceed with said work; to make changes in the drawings and specifications for said construction through its representative, the Contracting Officer; and the [fol. 12] plaintiff was required to conform to the changes so made. The United States further retained and exercised the right to inspect, examine, and test all material and workmanship, to decide whether equipment or material was equal to any particular standard stipulated for in the specifications, to approve the makers of machinery, mechanical or other equipment required, and to require that full information concerning all materials or articles used in said work be furnished the Contracting Officer. The United States further retained and exercised the right to require plaintiff to dismiss from work any employee deemed by said Contracting Officer to be incompetent, careless, or insubordinate or otherwise objectionable, and to pass upon the competency of the foreman or superintendent placed upon said work. The decision of the United States, acting through the Contracting Officer, was final and conclusive upon the plaintiff in all matters concerning delay in the work and any increased cost resulting therefrom. The United States retained and exercised the power to fix the hours of work for laborers and mechanics, to impose a penalty in case any laborers or mechanics were required or permitted to labor more than eight hours in any one day, and to determine the kind of labor to be employed. The United States retained and exercised the exclusive and sole power to decide all disputes arising under said contract and its decisions rendered through its representative and the War Department were binding and conclusive upon the plaintiff. The United States further retained and exercised the power to prohibit any decrease in the size of the plant employed by plaintiff and to require the employment of additional men and larger plant and equipment, if the rates of progress specified were not maintained by plaintiff. The United States further retained the power to prescribe the sanitary and safety requirements, to which the plaintiff was compelled to conform. The United States retained and exercised the power to prescribe conditions and

methods for blasting, to direct when shoring could be used in making excavations, and to limit the use of drilling machines and broaching outfits. The United States further retained and exercised the power to direct the length of piling to be used, to control the kind of stone to be used in ripraps [fol. 13] and to be placed in derrick stone protection, to waive the required tests on cement in case of emergency, to decide the sufficiency of all test of aggregate, and to prescribe the strength and density of the admixture of concrete. The United States further retained and exercised the power to approve the adequacy and dependability of the concrete mixing plant, and to direct when and at what temperatures concrete could be placed; to determine when joints should be made; to determine and approve the type, size, shape, quality, and strength of all materials for concrete forms; to require the making of expansion joints; to decide upon requirements for concrete forms; and to authorize and prescribe the weight of steel castings, nickel steel castings, iron castings, steel forgings, and other similar materials required under said contract; to pass upon the mechanical and physical properties of all materials used; to pass upon the qualifications and efficiency of welders used in said construction; to require the painting and repainting of all steel and iron according to the judgment of the inspector; to authorize by special permission the welding, burning, and torch cutting of any materials; and to direct and control the method of assembly and erection of the roller gates. The United States retained and exercised the power to prescribe the manner, methods, and means for the fabrication and construction of all machinery and materials and all work to be done in the erection and construction of said locks, dams, and appurtenant buildings and structures. Plaintiff avers that the contracts aforesaid were the method and plaintiff was the means and instrumentality used by the United States of America in the construction of said locks and dams.

XII

Plaintiff proceeded to perform its said contracts above recited and, during the years 1933 and 1934, completed the performance of its contracts for work at Marmet and London hereinbefore described in Subparagraphs (a) and (b) of Paragraph X, supra. Plaintiff further avers that it com- [fol. 14] pleted the performance of its contract at Winfield

described in Subparagraph (c) of Paragraph X in February, 1935. Plaintiff has partially performed its contract for work at Gallipolis hereinbefore described in Subparagraph (d) of Paragraph X, and is now engaged in the further performance of said contract in accordance with the terms thereof. For the work so performed by plaintiff under its said contracts with the United States of America and in accordance with the terms and provisions thereof and the designations and unit prices specified therein, plaintiff received, during the years 1933 and 1934, the gross sums hereinbefore alleged in Paragraph VII.

XIII

Prior to the making of each of the contracts aforesaid, the United States invited offers for bids for the furnishing of materials and labor in the construction of said works, and plaintiff made its bid pursuant to said invitations, based upon calculations as to the cost to it of the materials and labor to be furnished in the construction of each of the works covered by said contracts; and in making each of said bids, the plaintiff did not include within the amount thereof any sum whatsoever for the payment of the tax which the said defendant, the State Tax Commissioner of West Virginia, is now seeking to collect from the plaintiff.

XIV

Plaintiff avers that its said bids for furnishing materials and labor in the construction of the works above described were made upon invitation of the United States Government forwarded to plaintiff at Pittsburgh, Pennsylvania, through the United States Mail, and said bids and the bonds accompanying same were in writing and were made and executed by the plaintiff in Pittsburgh, Pennsylvania, and were delivered to the United States Engineer's Office at Huntington, West Virginia.

[fol. 15]

XV

Plaintiff, in compliance with and in performance of said contracts with the United States, manufactured, fabricated, sampled, tested, and inspected lock gates, roller dams, structural steel, machinery, tools, and other apparatus and equipment at the plaintiff's factories and mills at Neville Island in the State of Pennsylvania. Plaintiff avers that the United

States made part payment for many of said articles so manufactured; and, upon information and belief, avers that by virtue of the provisions of said contracts, title to such articles became vested in the United States outside the State of West Virginia. By orders sent from its office at Pittsburgh, Pennsylvania, plaintiff purchased from persons outside the State of West Virginia vast quantities of other materials for use in the performance of said contracts, such as cement, sand, lumber, bolts, rivets, steel, tools, implements, cables, machinery, and other materials and equipment. Plaintiff stored much of said material so manufactured or purchased at its plant at Neville Island or elsewhere outside the State of West Virginia. Plaintiff further owned or leased various river craft specially adapted for use in the construction of said locks and dams, such as barges, dredges, derrick boats, and other craft fitted out with machinery and equipment suitable for such purpose. Plaintiff transported and carried or caused to be transported and carried by rail or upon the navigable rivers all of said articles so manufactured or purchased, as well as repair and replacement parts therefor, from other States into the State of West Virginia. Plaintiff also transported or caused to be transported from other States into the State of West Virginia the barges, dredges, derrick boats, and other craft above mentioned. In the transportation and carriage of said materials, the plaintiff used towboats and barges owned and operated by plaintiff and towboats and barges chartered or rented from, or operated by, other persons. Plaintiff, at its expense, brought into the State of West Virginia a large number of experienced and skilled workmen regularly employed by it; and [fol. 16] employed and hired, outside the State of West Virginia, other experienced and skilled workmen and artisans who were citizens and residents of other States than the State of West Virginia, and brought them into the State of West Virginia because of their particular skill and fitness for the work. Plaintiff, upon information and belief, avers that the manufacture, fabrication, testing, inspection, and storage of articles and materials outside of the State of West Virginia, and the purchase and storage of other materials outside of said State for subsequent transportation into, and incorporation in the work in, said State, and the subsequent shipment thereof, by rail and river, into said State of West Virginia, and the operation of barges, steamboats, and other

river craft on the navigable rivers between other States and the State of West Virginia, the transportation of skilled workmen and artisans into said State, and various other acts, matters, and things done by plaintiff in the performance of its said contracts with the United States, constituted commerce among the several States, or transactions and business entirely outside the State of West Virginia. Plaintiff avers, upon information and belief, that gross income from the acts performed and things done by it in the performance of said contracts constituting interstate commerce or transactions entirely outside the State of West Virginia, amounted to approximately 60% of the entire gross income from said contracts.

XVI

Upon information and belief:

Plaintiff further avers that the acts performed and things done by it in the performance of its contracts above referred to, consisting of the manufacture, purchase, and storage of articles, materials, and equipment, and the transportation thereof into the State of West Virginia, the leasing of various river craft and the movement of said river craft, owned or leased by the plaintiff, between other States and the State of West Virginia, and the transportation of workmen into the State of West Virginia, as set forth in detail in Para-
[fol. 17] graph XV hereof, and constituting commerce among the several States, or transactions entirely outside the State of West Virginia, together with the placing, building, and erecting of said materials, equipment, and machinery into the said locks and dams in West Virginia, were continuous, uninterrupted, and related acts, all done in the performance, by the plaintiff, of a single contract obligation, to-wit, the furnishing of the materials and labor and work for the construction of said locks and dams, respectively, as provided for in said respective contracts with the United States of America.

XVII

Plaintiff avers that the gross income received by it from the United States under said contracts covered the cost and expense of all acts performed and things done by it in the performance of its contracts aforesaid, consisting of the manufacture, purchase, and storage of articles, materials, and equipment, and the transportation thereof into the State

of West Virginia, the leasing of various river craft and the movement of said river craft, owned or leased by the plaintiff, between other States and the State of West Virginia, and the transportation of workmen into the State of West Virginia, as set forth in detail in Paragraph XV hereof, and constituting commerce among the several States, or transactions entirely outside the State of West Virginia, as well as the cost of placing, building, and erecting the materials, equipment, and machinery furnished by it as aforesaid at the respective sites of the work, without separation or segregation of any kind whatsoever. Plaintiff further avers that, under the schedules of designations and unit prices contained in said contracts, the portion of the gross receipts for the various items of material and labor, entering into the various units designated in said schedules, are not separated or segregated. Upon information and belief, that the Gross Sales and Income Tax Law of the State of West Virginia contains no provision whereby the items making up the gross income, subject to said tax, may be separated as between in-
[fol. 18] come from intrastate business, income from interstate business, and income from transactions consummated entirely outside said State.

XVIII

Upon information and belief:

The contracts aforesaid were made and entered into by or on behalf of the United States of America, pursuant to the powers expressly or impliedly granted to the Federal Government by the Constitution of the United States. Article I, Section 8, Subdivision 3, of said Constitution grants to Congress the power to regulate commerce with foreign nations and among the several States. The same provision grants the incidental power to control, regulate, and improve the navigable streams of the country. Article I, Section 8, Subdivision 17, of said Constitution grants Congress the power to exercise exclusive legislation over all places purchased by the United States by the consent of the legislature of the State in which the same shall be, for the erection of needful buildings. Plaintiff avers the contracts aforesaid for the construction of locks, dams, and appurtenant buildings and structures were made and entered into by or on behalf of the United States pursuant to said powers to regulate commerce with foreign nations and among the several States,

to control, regulate, and improve the navigable streams of the country, and to legislate exclusively over all places purchased by the United States with the consent of the Legislature, for the erection of needful buildings, and were and are the means and method of conducting said operations adopted by the United States of America for the exercise and performance of its proper governmental functions.

[fol. 19] XIX

Upon information and belief:

That prior to the execution and delivery of the contracts aforesaid, all preliminary surveys, examinations and reports, required by law, were duly made and submitted, the necessary approvals of the Chief of Engineers of the War Department and of the Secretary of War were given and transmitted, and the work to be performed was duly authorized by Congress, including the necessary appropriations for the payment of the money stipulated for. Plaintiff is advised, believes, and therefore avers that every act, matter, and thing necessary or requisite to the validity of said contracts was performed and accomplished, and that said contracts constituted binding obligations of the United States of America.

XX

Upon information and belief:

The Kanawha and Ohio Rivers, upon which said locks and dams were, and are being, constructed and erected by plaintiff, are navigable rivers of the United States. For more than fifty years the United States has been engaged in the improvement of navigation thereon. In 1875 the construction of twelve locks and dams on the Kanawha River was authorized by Act of Congress. In 1879 the acquisition of lands for dam sites and locks was authorized and an appropriation was made for the payment therefor. Shortly thereafter locks and dams were constructed in said river by the United States and they have ever since been operated and maintained, through appropriations made by Congress. During said period of more than fifty years, as aforesaid, and to this date, the United States has continuously made vast expenditures of money in the improvement of said Kanawha River in furtherance of navigation, commerce, and public use. The Kanawha River is tributary to the Ohio and Mississippi River systems. Said rivers, to-

gether with their other tributaries, are navigable streams [fol. 20] and have long been important arteries of river commerce among the several States and with foreign nations. The locks, dams, and appurtenant buildings, constructed and being constructed by plaintiff under the contracts herein referred to, are necessary instrumentalities in the maintenance, improvement, and advancement of navigation upon the Kanawha River portion of said inland waterways system. Said locks, dams, and appurtenant buildings are for the maintenance and further development of the canalization of said Kanawha and Ohio Rivers and for the replacement of existing obsolete structures. Plaintiff is advised, believes, and therefore avers that said locks and dams are instrumentalities of interstate and foreign commerce, and that the furnishing of labor and material for the construction thereof is, in itself, interstate commerce. There are filed herewith, as part hereof, two printed letters from the Secretary of War to the Speaker of the House of Representatives of the Congress of the United States, designated, respectively, "House of Representatives, 70th Congress, 1st Session, Document 190" and "House of Representatives, 73rd Congress, 1st Session, Document 31," and marked "Plaintiff's Exhibit No. 7" and "Plaintiff's Exhibit No. 8," respectively, showing the history of the development and maintenance of commerce on the Kanawha River by the United States, and the examinations and surveys of said River preliminary to the construction of said locks and dams.

XXI

Plaintiff is further informed, believes, and therefore avers that all the lands upon which said locks, dams, and appurtenant buildings were constructed, were acquired by purchase by the United States from the persons owning the same, for said purpose; that the State of West Virginia has duly and lawfully given its consent and approval to said acquisition of said lands by the United States of America; and that all the work of erecting said locks, dams, and appurtenant buildings under the contracts aforesaid was performed upon lands so purchased by the United States of America.

[fol. 21] XXII

Gross Sales Tax Statutes

Upon information and belief:

That there was enacted by the Legislature of West Virginia, at an extraordinary session in the year 1925, an Act known as Chapter 1, Acts of One Thousand Nine Hundred Twenty-five, Extraordinary Session of the Legislature of West Virginia, with the following title:

"An Act to provide for the raising of additional public revenue by a tax upon the privilege of engaging in certain occupations; to provide for the ascertainment, assessment, and collection of such tax; to provide penalties for violation of the terms hereof; and to repeal certain statutes."

By the provisions of the Act of 1925 aforesaid, it was expressly provided that the taxes, thereby assessed and levied, were privilege taxes against persons on account of business activities, and that any person continuing in any business, for which such privilege tax was imposed, was deemed thereby to have applied for and to have duly obtained from the State of West Virginia a license to engage in and conduct such business for the current tax year upon the condition that the tax accruing to the State of West Virginia under the provisions of said Act would be paid, and that such person would thereby be duly licensed to engage in and conduct such business. The Act of 1925 aforesaid was incorporated and placed in, and reenacted at the time of the adoption of, the Official Code of West Virginia, and made a part thereof by Article 13, Chapter 11, Code of West Virginia, effective January 1, 1931. Section 2 thereof provided, in part, as follows:

"There is hereby levied and shall be collected annual privilege taxes against the persons, on account of the business activities, and in the amounts to be determined by the application of rates against values or gross income as the case may be, as follows:

* * * * * * *

[fol. 22] "(e) Upon every person engaging or continuing within this State in the business of contracting, the tax shall be equal to three-tenths of one per cent of the gross income of the business; * * *"

By Chapter 33, Acts of the Legislature, at its First Extraordinary Session for the year 1933, the Legislature amended and reenacted said Article 13, Chapter 11, of the Code of West Virginia, One Thousand Nine Hundred Thirtyone, which said Act was made effective on May 27, 1933, the title of which is as follows:

"An Act to provide for the raising of additional public revenue by amending and reenacting article thirteen, chapter eleven of the code of West Virginia, one thousand nine hundred thirty-one, relating to business and occupation taxes, by repealing all of sections one through seventeen, inclusive, and enacting and reenacting sections one through twenty-three, inclusive; and providing for and imposing a privilege tax upon the exercise of certain privileges in the state, by repealing sections eighty-one through eighty-four, inclusive, article twelve, chapter eleven of said code; and enacting a new article to be designated article twelve-(a), chapter eleven of said code."

Section 2, Article 13, Chapter 11, of the Code of West Virginia of 1931, as amended by Chapter 33, Acts of the Legislature of West Virginia, at its First Extraordinary Session in the year 1933, provides, in part, as follows:

"There is hereby levied and shall be collected annual privilege taxes against the persons, on account of the business and other activities, and in the amounts to be determined by the application of rates against values or gross income, as follows:

* * * * * * *

"(e) Upon every person engaging or continuing within this State in the business of contracting, the tax shall be equal to two per cent of the gross income of the business; * * *"

[fol. 23] By said statute, privilege taxes for the years 1933 and 1934 were imposed upon the business of contracting at the following rates: for the period from January 1, 1933, to May 26, 1933, inclusive, three-tenths of one per cent of the gross income of the business; and for the period from May 27, 1933, to December 31, 1934, inclusive, two per cent of the gross income of the business.

XXIII

Upon information and belief:

That the aforementioned laws incorporated in Article 13, Chapter 11, of the Code of West Virginia, One Thousand Nine Hundred Thirty-one, and the amendments and reenactments thereof, were enacted for the express and sole purpose of providing revenues for the State of West Virginia and not as regulatory measures; and the revenues realized thereby become a part of the general funds of the State of West Virginia in the State Treasury thereof, and are for the general purpose of the State Government.

Said Acts contain no provision for the separation or segregation of gross income derived from intrastate business from gross income derived from interstate business, or from transactions entirely outside the State of West Virginia, with respect to the tax imposed upon the privilege of engaging in the business of contracting. Said Acts further expressly provide that the tax imposed thereby shall be in addition to all other licenses and taxes levied by law as a condition precedent to engaging in any business, trade, or calling. Plaintiff is advised, believes, and therefore avers that the privilege taxes imposed by said Act are in addition to other taxes for the benefit of the State of West Virginia, levied on property, real and personal. Plaintiff is further advised, believes, and therefore avers that, under the provisions of said Act governing the assessment of said privilege taxes by the Tax Commissioner, in the event that the taxpayer fails or refuses to make a return, either in whole or in part, the assessment of the tax by the Tax Commissioner is final as to any person who refuses to make a return.

[fol. 24]

XXIV

Upon information and belief:

That during the years 1933 and 1934 plaintiff owned and maintained in the State of West Virginia certain personal property and equipment for use in the construction of the locks and dams aforesaid under plaintiff's contract with the United States. Under the laws of the State of West Virginia, said personal property was subject to the tax in the respective counties of said State in which the same was located. Plaintiff made returns of said property to the Assessors of Kanawha County, Putnam County, and Mason

County, respectively, and paid the taxes thereon to the State of West Virginia through the Sheriff and ex-officio Treasurer of each of said counties where said personal property was located. The total amount of taxes paid to the State of West Virginia on said personal property for the years 1933 and 1934 was $5,790.62, the respective payments being as follows:

To the Sheriff of Kanawha County, 1933	$1,912.28
To the Sheriff of Kanawha County, 1934	1,242.12
To the Sheriff of Putnam County, 1934	1,423.50
To the Sheriff of Mason County, 1934	1,212.72
Total	$5,790.62

Plaintiff avers that the only property owned by plaintiff in West Virginia is that used in the construction of said locks and dams.

XXV.

Plaintiff further avers, upon information and belief, that the law of the State of West Virginia embodied in said Article 13, Chapter 11, of the Code of West Virginia, 1931, and the amendments thereto, if construed to be applicable to the plaintiff with respect to the proceeds received by plaintiff under its said contracts with the United States Government, is void, invalid, and contrary to and in viola- [fol. 25] tion of the Constitution of the United States and the amendments thereto, and is unenforcible for the following reasons:

(a) Said Act violates and is in conflict with Article I, Section 8, Subdivision 3, of the Constitution of the United States, which provides:

"The Congress shall have the power * * * to regulate commerce with foreign nations and among the several States;"

in that said statute imposes a direct tax, amounting to 2% of the contract price or gross receipts, upon contracts providing for the performance of labor and the furnishing of materials, a large part of which constitutes commerce among the several states, without any provision for the segregation and separation of the portion of the income derived from interstate commerce from the portion thereof

derived from intrastate commerce, which tax is a burden on and hindrance to said interstate commerce.

Said Act further violates and is in conflict with said Article I, Section 8, Subdivision 3, of the Constitution of the United States, in that it imposes a direct tax, amounting to 2% of the cost of the work, upon the exercise by the Government of the United States of its incidental power to regulate, control, and improve the navigable streams of this country, which tax is a burden on and hindrance to the exercise of said power.

Said Act further violates and is in conflict with Article I, Section 8, Subdivision 3, of the Constitution of the United States, in that it imposes a direct tax, amounting to 2% of the cost of the work, on the erection of locks and dams in navigable waters of the United States, which erection of locks and dams is, in itself, interstate commerce, and which [fol. 26] tax is a burden thereon and a hindrance thereto.

(b) Said Act violates and is in conflict with Article I, Section 8, Subdivision 17, of the Constitution of the United States, which provides as follows:

"The Congress shall have power * * * to exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) and may, by cession of particular States and the acceptance of Congress, become the seat of government of the United States, and to exercise like authority over all places purchased by the consent of the Legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dockyards, and other needful buildings;"

in that said Act constitutes legislation by a State in respect of property and places over which the United States of America has exclusive legislative power and authority and in that said Act imposes a state tax for the privilege of carrying on business within territory under the exclusive legislative power and authority of the United States.

(c) Said Act violates and is in conflict with the Fourteenth Amendment, Section 1, of the Constitution of the United States, which provides as follows:

"No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of

life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws;''

in that it imposes a direct tax and burden on the plaintiff in the exercise of its rights to do business in interstate commerce and imposes a direct tax and burden on the manufacture of articles and the transaction of business outside of the State of West Virginia.

[fol. 27] XXVI

Plaintiff further avers, upon information and belief, that the actions of the defendant, Fred L. Fox, as State Tax Commissioner of the State of West Virginia, in making the assessment aforesaid, for the years 1933 and 1934, respectively, upon the gross receipts of money received by your plaintiff from the United States of America under its contracts aforesaid and the said threatened act to proceed in accordance with the law to collect the same and to distrain on the property of plaintiff to collect said tax, under color of the authority provided in said Gross Sales and Income Tax Law, are invalid and void.

XXVII

Plaintiff avers, upon information and belief, that unless the defendant Tax Commissioner is enjoined and restrained from collecting the tax assessed against plaintiff as aforesaid and unless said assessment is declared invalid, plaintiff will sustain irreparable loss, damage, and injury, for the following reasons:

(a) Because a tax imposed, due, and unpaid under said Article 13, Chapter 11, of the Code of West Virginia, 1931, and amendments thereto, is a debt to the State of West Virginia and a lien upon the property used in the business or occupation upon which said tax is imposed and has the same priority as the lien of a general property tax and constitutes a cloud upon the title to the property of your plaintiff within the territorial limits of the State of West Virginia;

(b) The said Act further provides heavy statutory penalties for any default or failure in the payment of any tax assessed thereunder;

[fol. 28] (c) The said Act further authorizes the defendant as Tax Commissioner to distrain upon any goods, chattels, or intangibles represented by negotiable evidences of indebtedness, for the amount of all taxes and penalties accrued and unpaid under said Act;

(d) The lien provided for by said Act and the threatened distraint, if levied, would stop, or materially interfere with, the performance, by plaintiff, of work under its contract with the United States Government;

(e) Because the tax assessed by the defendant against the plaintiff for failure to include in its Gross Sales and Income Tax Return for the years 1933 and 1934 the gross proceeds of its contracts with the United States Government is, according to the provisions of said act, final as to plaintiff;

(f) Because the tax assessed against plaintiff on the gross income from its government contracts is wholly void and illegal and the statute under which the same was assessed is wholly inapplicable to said portion of plaintiff's gross income. The remedies for errors and irregularities provided for in said statute are likewise inapplicable;

(g) There is no remedy provided under the laws of the State of West Virginia whereby the plaintiff could compel repayment to it of any money paid as taxes to the defendant, whether said taxes be paid voluntarily by the plaintiff or be illegally collected from the plaintiff by seizure and sale of its property as threatened by said State Tax Commissioner;

[fol. 29] (h) After the entry of any judgment or decree in favor of the plaintiff for the recovery of said money, the appropriation of money by the Legislature of the State of West Virginia to satisfy any such judgment or decree would rest entirely and solely within the discretion of the members thereof, and there is no method to compel the Legislature to make such appropriation.

XXVIII

Continuing and recurring attempts by the defendant or any successor as State Tax Commissioner to assess and collect taxes under said Gross Sales and Income Tax Law will lead to a multiplicity of suits.

XXIX

Plaintiff avers that it has no adequate remedy at law and is wholly without remedy save in a court of equity.

WHEREFORE, and inasmuch as plaintiff is remediless in the premises, according to either the laws of the State of West Virginia or of the United States, or under the common law, and is remediable only in this Honorable Court, and to the end that the plaintiff may be saved from the aforesaid heavy statutory penalties, may not be subjected to distraints which will otherwise result, may not suffer great and irreparable injury, loss and damage, may be permitted to pursue and carry on its business under said contracts without unlawful hindrance and obstructions, and may not be subjected to illegal liens and clouds on, and seizure of, its property at the instance of the defendant, plaintiff prays as follows:

[fol. 30] First. That the said Fred L. Fox, individually and as State Tax Commissioner of the State of West Virginia, his assistants, agents, officers, servants, employees, and attorneys, be temporarily and permanently enjoined, inhibited, and restrained from proceeding further and from making any levy upon any property of plaintiff located within the State of West Virginia, and from interfering with the plaintiff, and its rights, in any manner whatsoever, by reason of any such purported assessment by the said defendant, Fred L. Fox, as State Tax Commissioner as aforesaid, upon the gross receipts of money received by plaintiff during the years 1933 and 1934, respectively, from the United States of America, under and by virtue of the said written contracts between plaintiff and the said the United States of America; and from attempting to collect from plaintiff in any manner, any sum as a tax under said Gross Sales and Income Tax Law of West Virginia;

Second. That this Court will hold and accordingly decree that the law of the State of West Virginia, commonly known as the "Gross Sales and Income Tax Law," incorporated in the Code of West Virginia of 1931 and amendments thereto, violates the Constitution of the United States of America and is unconstitutional and void in so far as the said law attempts to give the said defendant, Fred L. Fox, State Tax Commissioner of the State of West Virginia, or any other officer or agent of said State, any

power or authority to make any assessment upon the gross receipts of money received by plaintiff for carrying out and performing the provisions of the written contracts aforesaid, between plaintiff and the United States of America;

Third. That the aforesaid assessment by the defendant of gross sales and income taxes claimed to be due the State of West Virginia for the years 1933 and 1934 in the aggregate amount of $135,761.51 be adjudged invalid and void;

Fourth. That this Court cause to be issued the necessary process and subpœnas by the Clerk of this Court, directed to said defendant herein, requiring him to be present and appear at a time to be fixed by this Court and then and there answer the allegations and averments of this bill;

[fol. 31] Fifth. That a copy of this bill, order, and subpœna be served upon the Honorable H. G. Kump, Governor of the State of West Virginia, and upon the Honorable Homer A. Holt, Attorney General of the State of West Virginia;

Sixth. That a temporary restraining order be granted by this Court instanter restraining the defendant, his assistants, agents, officers, servants, employees, and attorneys, as above prayed, until a hearing can be had upon this bill;

Seventh. That the matters set forth in this bill of complaint be heard and determined by this Court upon a date to be named by this Court, and that the Court provide a hearing by three judges, as provided by law, after due notice thereof;

Eighth. And that this Court grant unto this plaintiff such other, further, general and special relief in the premises as the case may require and as this Court may deem fit.

And plaintiff will ever pray, etc.

The Dravo Contracting Company, a Corporation Organized and Existing under the Laws of the State of Pennsylvania, Plaintiff, by Counsel, Koontz, Hurlbutt & Revercomb, Moorhead & Knox, Attorneys for Plaintiff. W. C. Revercomb, W. Elliott Nefflen, Solicitors.

[fol. 32] *Duly sworn to by J. S. Miller. Jurat omitted in printing.*

[fol. 33] EXHIBIT No. 1 TO BILL OF COMPLAINT

Revenue Law 1933

The Gross Sales and Income Tax Law

Committee Substitute for Senate Bill No. 1, An Act of the Legislature of West Virginia

[Passed May 26, 1933; in effect May 27, 1933; approved by the Governor]

An Act to provide for the raising of additional public revenue by amending and reenacting article thirteen, chapter eleven of the code of West Virginia, one thousand nine hundred thirty-one, relating to business and occupation taxes, by repealing all of sections one through seventeen, inclusive, and enacting and reenacting sections one through twenty-three, inclusive; and providing for and imposing a privilege tax upon the exercise of certain privileges in the state, by repealing sections eighty-one through eighty-four, inclusive, article twelve, chapter eleven of said code; and enacting a new article to be designated article twelve-(a), chapter eleven of said code.

Be it enacted by the Legislature of West Virginia:

That sections one through seventeen, inclusive, article thirteen, chapter eleven of the code of West Virginia, one thousand nine hundred thirty-one, be and are hereby repealed and sections one through twenty-three, inclusive, be and are hereby enacted in lieu thereof; and that sections eighty-one through eighty-four, inclusive, article twelve, chapter eleven of said code be and are hereby repealed and article twelve-(a) be and is hereby enacted and added to chapter eleven.

Section 1. When used in this article, the term "person" or the term "company" herein used interchangeably, includes any individual, firm, copartnership, joint adventure, association, corporation, trust or any other group or combination acting as a unit, and the plural as well as the singular number, unless the intention to give a more limited meaning is disclosed by the context.

"Tax year" or "taxable year" means either the calendar year, or the taxpayer's fiscal year when permission is

obtained from the tax commissioner to use same as the tax period in lieu of the calendar year.

"Sale" or "sales" includes the exchange of properties as well as the sale thereof for money, every closed transaction constituting a sale.

"Taxpayer" means any person liable for any tax hereunder.

"Gross income" means the gross receipts of the taxpayer received as compensation for personal services and the gross receipts of the taxpayer derived from trade, business, commerce or sales and the value proceeding or accruing from the sale of tangible property (real or personal), or service, or both, and all receipts by reason of the investment of the capital of the business engaged in, including interest, discount, rentals, royalties, fees or other emoluments however designated and without any deductions on account of the cost of property sold, the cost of materials used, labor costs, taxes, royalties, interest or discount paid or any other expense whatsoever.

"Business," as used in this article, shall include all activities engaged in or caused to be engaged in with the object of gain or economic benefit either direct or indirect. The production of raw materials or manufactured products, which are used or consumed in the main business, shall be deemed business engaged in taxable in the class in which it falls.

"Gross proceeds of sales" means the value actually proceeding from the sale of tangible property without any deduction on account of the cost of property sold or expenses of any kind. The words "gross income" and "gross proceeds of sales" shall not be construed to include cash discounts allowed and taken on sales; the proceeds of sale of goods, wares or merchandise returned by customers when the sale price is refunded either in cash or by credit; or the sale price of any article accepted as part payment on any new article sold, if the full sale price of the new article is included in the "gross income" or "gross proceeds of sales".

"Service business or calling" shall include all nonprofessional activities engaged in for other persons for a consideration, which involve the rendering of a service as distinguished from the production or sale of tangible prop-

erty, but shall not include the services rendered by an employee to his employer.

The classification of "wholesaler" or "jobber" shall apply only to a person doing a regularly organized jobbing business, known to the trade as such, selling to licensed retail merchants or jobbers, or to others in wholesale quantities and at wholesale prices.

Sec. 2. There is hereby levied and shall be collected annual privilege taxes against the persons, on account of the business and other activities, and in the amounts to be determined by the application of rates against values or gross income, as follows:

(a) Upon every person engaging or continuing within this state in the business of producing for sale, profit or commercial use any natural resource products, the amount of such tax to be equal to the value of the articles produced as shown by the gross proceeds derived from the sale thereof by the producer, except as her-inafter provided, multiplied by the respective rates as follows: Coal, one per cent; limestone or sandstone, quarried or mined, one and one-half per cent; oil, three per cent; natural gas, in excess of the value of five thousand dollars, six per cent; blast furnace slag, three per cent; sand, gravel or other mineral product, not quarried or mined, three per cent; timber, one and one-half per cent; other natural resource products, two per cent. The measure of this tax is the value of the entire production in this state, regardless of the place of sale or the fact that delivery may be made to points outside the state.

(b) Upon every person engaging or continuing within this state in the business of manufacturing, compounding, or preparing for sale, profit, or commercial use, either directly or through the activity of others in whole or part, any article or articles, substance or substances, commodity or commodities, or electric power not produced by public utilities taxable under other provisions of this section, the amount of the tax to be equal to the value of the articles, substance, commodities or electric power manufactured, compounded or prepared for sale, as shown by the gross proceeds derived from the sale thereof by the manufacturer or person compounding or preparing the same (except as hereinafter provided), multiplied by a rate of three-

tenths of one per cent. The measure of this tax is the value of the entire product manufactured, compounded, or prepared in this state for sale, profit or commercial use, regardless of the place of sale or the fact that deliveries may be made to points outside the state.

If any person liable for any tax under subdivisions (a) or (b) shall ship or transport his products or any part thereof out of the state without making sale of such products, the value of the products in the condition or form in which they exist immediately before transportation out of the state shall be the basis for the assessment of the tax imposed in said subdivision; and the tax commissioner shall prescribe equitable and uniform rules for ascertaining such value.

In determining value, however, as regards sales from one to another of affiliated companies or persons, or under other circumstances where the relation between the buyer and seller is such that the gross proceeds from the sale are not indicative of the true value of the subject matter of the sale, the tax commissioner shall prescribe uniform and equitable rules for determining the value upon which such privilege tax shall be levied, corresponding as nearly as possible to the gross proceeds from the sale of similar products of like quality or character where no common interest exists between the buyer and seller but the circumstances and conditions are otherwise similar.

(c) Upon every person engaging or continuing within this state in the business of selling any tangible property whatsoever, real or personal, except sales by any person engaging or continuing in the business of horticulture, agriculture or grazing, stocks, bonds or other evidences of indebtedness, there is likewise hereby levied, and shall be collected, a tax equivalent to three-fourths of one per cent of the gross income of the business, except that in the case of a wholesaler or jobber, the tax shall be equal to fifteen one-hundredths of one per cent of the gross income of the business;

(d) Upon any person engaging or continuing within this state in any public service or utility business, except railroad, railroad car, express, pipe line, telephone and telegraph companies, water carriers by steamboat or steamship and motor vehicle carriers, there is likewise hereby

levied and shall be collected taxes on account of the business engaged in equal to the gross income of the business multiplied by the respective rates as follows: Street and interurban and electric railways, one per cent; water companies, four per cent, except as to income from municipally owned water plants; electric light and power companies, four per cent on sales and demand charges for domestic purposes and commercial lighting and three per cent on sales and demand charges for all other purposes, except as to income from municipally owned plants producing or purchasing electricity and distributing same; natural gas companies, three per cent on the gross income, said gross income for this purpose to be determined by deducting from gross income from all sales to consumers the amount of the tax paid by the taxpayer under subdivision (a) of this section; toll bridge companies, three per cent; and upon all other public service or utility business, two per cent. The measure of this tax shall not include gross income derived from commerce between this state and other states of the United States or between this state and foreign countries.

(e) Upon every person engaging or continuing within this state in the business of contracting, the tax shall be equal to two per cent of the gross income of the business;

(f) Upon every person engaging or continuing within this state in the business of banking, the tax shall be equal to five-tenths of one per cent of the gross income of the business;

(g) Upon every person engaging or continuing within this state in the business of operating a theater, opera house, moving picture show, vaudeville, amusement park, dance hall, skating rink, race track, radio broadcasting station or any other place at which amusements are offered to the public, the tax shall be equal to one and one-half per cent of the gross income of the business;

(h) Upon every person engaging or continuing within this state in any service business or calling not otherwise specifically taxed under this act, there is likewise hereby levied and shall be collected a tax equal to one per cent of the gross income of any such business;

(i) Upon every person engaging or continuing within this state in any business, profession, trade, occupation or

calling not included in the preceding subdivisions or any other provision of this act (but not including a person engaging or continuing in the business of horticulture, agriculture or grazing) there is likewise hereby levied and shall be collected, a tax equal to one per cent of the gross income of any such activity. This subdivision shall apply to the gross incomes of persons taxable under other subdivisions hereof not derived from the exercise of privileges taxable thereunder.

Gross income included in the measure of the tax under subdivisions (a) and (b) hereof, except in the case of production of natural gas, shall neither be added nor deducted in computing the tax levied under the other subdivisions of this article.

A person exercising any privilege taxable under subdivisions (a) or (b) of this section and engaging in the business of selling his natural resource or manufactured products at retail in this state shall be required to make returns of the gross proceeds of such retail sales and pay the tax imposed in subdivision (c) of this section for the privilege of engaging in the business of selling such natural resource or manufactured products at retail in this state. But any person exercising any privilege taxable under subdivisions (a) or (b) of this section and engaging in the business of selling his natural resource or manufactured products to manufacturers, wholesalers or jobbers, and in the case of limestone, sand, gravel or other mineral product, to commercial consumers, shall not be required to pay the tax imposed in subdivision (c) of this section for the privilege of selling such natural resource products or manufactured products at wholesale.

[fol. 34] Manufacturers exercising any privilege taxable under subdivision (b) of this section shall not be required to pay the tax imposed in subdivision (c) of this section for the privilege of selling their manufactured products for delivery outside of this state, but the gross income derived from the sale of such manufactured products outside of this state shall be included in determining the measure of the tax imposed on such manufacturer in said subdivision (b).

A person exercising privileges taxable under the other subdivisions of this section, producing coal, oil, natural gas, minerals, timber or other natural resource products

the production of which is taxable under subdivision (a), and using or consuming same in his business, shall be deemed to be engaged in the business of mining and producing coal, oil, natural gas, minerals, timber or other natural resource products for sale profit or commercial use, and shall be required to make returns on account of the production of the business showing the gross proceeds or equivalent in accordance with uniform and equitable rules for determining the value upon which such privilege tax shall be levied, corresponding as nearly as possible to the gross proceeds from the sale of similar products of like quality or character by other taxpayers, which rules the tax commissioner shall prescribe.

Sec. 3. There shall be an exemption in every case, except as to the privileges taxable under section two-(i) of this article, of twenty-five dollars in amount of tax computed under the provisions of this article. A person exercising a privilege taxable hereunder for a fractional part of a tax year shall be entitled to an exemption of the sum bearing the proportion to twenty-five dollars that the period of time the privilege is exercised bears to a whole year. Only one exemption shall be allowed to any one person, whether he exercise one or more privileges taxable hereunder.

In computing the tax levied under section two-(i) of this article, there shall be deducted from gross income an exemption of six dollars in amount of tax, plus an exemption of four dollars in the case of a married person living with a spouse actually dependent upon such person for support, and an additional exemption of two dollars for each person actually dependent upon the taxpayer; but the maximum exemption in every case shall be twenty-four dollars. A person exercising any privilege taxable under section two-(i) of this article, whose gross income exceeds six hundred dollars, if single or if married and not living with husband or wife, or whose gross income exceeds one thousand dollars, if married and living with husband or wife dependent upon such person for support, shall file a return or returns as required by sections four and five of this article.

The provisions of this article shall not apply to: (a) Insurance companies which pay the state of West Virginia a tax upon premiums; (b) mutual savings banks not having

a capital stock represented by shares and nonprofit mutual building and loan associations operated for the exclusive benefit of their members; (c) nonprofit cemetery companies organized and operated for the exclusive benefit of their members; (d) societies, organizations and, associations organized and operated for the exclusive benefit of their members and not for profit; and (e) corporations, associations and societies organized and operated exclusively for religious or charitable purposes.

Sec. 4. The taxes levied hereunder shall be payable in quarterly installments on or before the expiration of thirty days from the end of the quarter in which they accrue. The taxpayer shall, within thirty days from the expiration of each quarter, make out an estimate of the tax for which he is liable for such quarter, verify the same by oath, and mail the same together with a remittance in the form required by section eleven of this article for the amount of the tax, to the office of the tax commissioner. The tax commissioner, if he deems it necessary to insure payment of the tax, may require return and payment under this section for other than quarter year periods. In estimating the amount of the tax due for each quarter the taxpayer may deduct one-fourth of the total exemption allowed for the year. When the total tax for which any person is liable under this article does not exceed the sum of one hundred dollars in any year, the taxpayer may pay the same quarterly as aforesaid or pay the same at the end of the month next following the close of the tax year.

Sec. 5. On or before thirty days after the end of the tax year each person liable for the payment of a tax under section two of this article shall make a return showing the gross proceeds of sales or gross income of business, trade or calling, and compute the amount of tax chargeable against him in accordance with the provisions of this article and deduct the amount of quarterly payments (as hereinbefore provided), if any, and transmit with his report a remittance in the form required by section eleven of this article covering the residue of the tax chargeable against him to the office of the tax commissioner; such return shall be verified by the oath of the taxpayer, if made by an individual, or by the oath of the president, vice presi-

dent, secretary or treasurer of a corporation, if made on behalf of a corporation. If made on behalf of a partnership, joint adventure, association, trust, or any other group or combination acting as a unit, any individual delegated by such firm, copartnership, joint adventure, association, trust or any other group or combination acting as a unit, shall make the oath on behalf of the taxpayer. If for any reason it is not practicable for the individual taxpayer to make the oath, the same may be made by any duly authorized agent. The tax commissioner, for good cause shown, may extend the time for making the annual return on the application of any taxpayer and grant such reasonable additional time within which to make the same as may, by him, be deemed advisable.

Sec. 6. If the taxpayer shall make any error in computing the tax assessable against him, the tax commissioner shall correct such error or reassess the proper amount of taxes, and notify the taxpayer of his action by mailing to him promptly a copy of the corrected assessment, and any additional tax for which such taxpayer may be liable shall be paid within ten days after the receipt of such statement.

If the amount already paid exceeds that which should have been paid on the basis of the tax so recomputed, the excess so paid shall be immediately refunded to the taxpayer upon the requisition of the tax commissioner to the state auditor, who shall issue his warrant on the treasurer, which shall be payable out of any funds available for the purpose. The taxpayer may, at his election, apply an overpayment credit to taxes subsequently accruing hereunder.

Sec. 7. If any person fail or refuse to make a return, either in whole or in part, or if the tax commissioner has reasonable ground to believe that any return made is so deficient as not to form the basis of a satisfactory assessment of the tax, he may proceed as he deems best to obtain information on which to base the assessment of the tax. The tax commissioner may by himself or his duly appointed agent, make examination of the books, records and papers, and audit the accounts of any such person, and may take the evidence, administered by himself or his agent, on oath, of any person who he may believe shall be in possession of any relevant information. As soon as possible after procuring such information as he may be able to obtain as to

any person failing or refusing to make a return, the tax commissioner shall proceed to assess the tax and shall notify the person assessed of the amount of the tax. The assessment of the tax by the tax commissioner shall be final as to any person who refused to make a return.

Sec. 8. If any person, having made the return and paid the tax as provided by this article, feels aggrieved by the assessment so made upon him for any year by the tax commissioner, he may apply to the board of public works by petition, in writing, within thirty days after notice is mailed to him by the tax commissioner, for a hearing and a correction of the amount of the tax so assessed upon him by the tax commissioner, in which petition shall be set forth the reasons why such hearings should be granted and the amount such tax should be reduced. The board shall promptly consider such petition, and may grant such hearing or deny the same. If denied, the petitioner shall be forthwith notified thereof; if granted, the board shall notify the petitioner of the time and place fixed for such hearing. After such hearing, the board may make such order in the matter as may appear to it just and lawful, and shall furnish a copy of such order to the petitioner. Any person improperly charged with any tax and required to pay the same may recover the amount paid, together with interest, in any proper action or suit against the tax commissioner, and the circuit court of the county in which the taxpayer resides or is located shall have original jurisdiction of any action to recover any tax improperly collected. It shall not be necessary for the taxpayer to protest against the payment of the tax or to make any demand to have the same refunded in order to maintain such suit. In any suit to recover taxes paid or to collect taxes, the court shall adjudge costs to such extent and in such manner as may be deemed equitable. Upon presentation of a certified copy of a judgment so obtained, the auditor shall issue his warrant upon any funds in the treasury available for the payment thereof.

No injunction shall be awarded by any court or judge to restrain the collection of the taxes imposed by this article, or any part of them, due from any person, except upon the ground that the assessment thereof was in violation of the constitution of the United States, or of this state; or that

the same were fraudulently assessed; or that there was a mistake made in the amount of taxes assessed upon such person. In the latter case, no such injunction shall be awarded, unless application shall first have been made to the board of public works to correct the alleged mistake and the board shall have refused to do so, which fact shall be stated in the bill, and unless the complainant shall have paid into the treasury of the state all taxes appearing by the bill of complaint to be owing.

Section 9. The assessment of taxes herein made and the returns required therefor shall be for the year ending on the thirty-first day of December. If the taxpayer, in exercising a privilege taxable under this article, keeps the books reflecting the same on a basis other than the calendar year, he may, with the assent of the tax commissioner, make his annual returns and pay taxes for the year covering his accounting period, as shown by the method of keeping his books.

Sec. 10. The tax imposed by this article shall be in addition to all other licenses and taxes levied by law as a condition precedent to engaging in any business, trade or calling. A person exercising a privilege taxable under this article, subject to the payment of all licenses and charges which are condition precedent to exercising the privilege taxed, may exercise the privilege for the current tax year upon the condition that he shall pay the tax accruing under this article.

Sec. 11. All remittances of taxes imposed by this article shall be made to the tax commissioner, by bank draft, certified check, cashier's check, money order, or certificate of deposit, who shall issue his receipts therefor to the taxpayers and shall pay the moneys into the state treasury to be kept and accounted for as provided by law.

Sec. 12. A tax due and unpaid under this article shall be a debt due the state and shall be a lien upon the property used in the business or occupation upon which it is imposed. The lien shall have the same priority as the lien of the general property tax. A penalty of five per cent of the tax shall be added for any default for thirty days or less and for each succeeding thirty days elapsing before payment there shall be added an additional penalty of one per

cent. The additional one per cent penalty shall not apply until a ten day notice of delinquency shall have been sent to the taxpayer.

Sec. 13. The tax commissioner may by himself, or a duly appointed agent mentioned in section twenty-two of this article, collect taxes due and unpaid under this article, together with all accrued penalties, by action in assumpsit, motion for judgment, or other appropriate proceeding in the circuit court of the county in which the privilege taxed had been exercised. After delinquency shall have continued sixty days, the tax commissioner may proceed, by himself or agent, in the circuit court of the county in which the privilege taxed had been exercised to obtain an injunction restraining the further exercise of the privilege until full payment shall have been made of all taxes and penalties due under this article. In any proceeding under this section upon judgment or decree for the plaintiff he shall be awarded his costs.

Sec. 14. The tax imposed by this article shall be a lien upon the property of any person subject to the provisions hereof who shall sell out his business or stock of goods, or shall quit business, and such person shall be required to make the return provided for under section five of this article within thirty days after the date he sold out his business or stock of goods, or quit business, and his successor in business shall be required to withhold sufficient of the purchase money to cover the amount of such taxes due and unpaid until such time as the former owner shall produce a receipt from the tax commissioner showing that the taxes have ben paid. If the purchaser of a business or stock of goods shall fail to withhold purchase money as above provided, and the taxes shall be due and unpaid after the thirty day period allowed, he shall be personally liable for the payment of the taxes accrued and unpaid on account of the operation of the business by the former owner.

Sec. 15. The secretary of state shall withhold the issuance of any certificate of dissolution or withdrawal in the case of any corporation organized under the laws of this state, or organized under the laws of another state and admitted to do business in this state, until the receipt of a notice from the tax commissioner to the effect that the tax levied under this article against any such corporation has

been paid or provided for, if any such corporation is a taxpayer under this article, or until he shall be notified by the tax commissioner that the applicant is not subject to pay a tax hereunder.

Sec. 16. All state, county and district officers and agents making contracts on behalf of the state of West Virginia or any political subdivision thereof shall withhold payment in the final settlement of such contracts until the receipt of a certificate from the tax commissioner to the effect that all taxes levied or accrued under this act against the contractor with respect to such contracts have been paid.

Sec. 17. In the distribution, voluntary or compulsory, in receivership, bankruptcy or otherwise, of the estate of any person, firm or corporation, all taxes due and unpaid under this article shall be paid from the first money available for distribution in priority to all claims, except taxes and debts due the United States. Any person charged with the administration of an estate who shall violate the provisions of this section shall be personally liable for any taxes accrued and unpaid under this article, which are chargeable against the person, firm or corporation whose estate is in administration.

Sec. 18. The tax commissioner may, with the approval of the governor, appoint not more than twelve agents for the entire state for the collection of delinquent taxes, delinquent license taxes and all penalties; all delinquent taxes, delinquent license taxes and all penalties so collected shall be, by the tax commissioner, covered into the state treasury to the credit of the state general fund. The salary of every such agent appointed shall be determined by the state tax commissioner by and with the approval of the governor.

[fol. 35] Sec. 19. The tax commissioner for the more effective collection of the tax may file with the clerk of the county court of any county a certified copy of an assessment of taxes under this article. A certificate so filed shall be recorded in a book provided for the purpose and thereafter shall constitute binding notice of the lien created by this article upon all lands of the taxpayer located in the county as against all parties whose interest arose after such recordation. Upon payment of taxes delinquent under this article the lien of

which shall have been recorded the tax commissioner shall certify in duplicate the fact and amount of payment and the balance due, if any and shall forward the certificates, one to the taxpayer and one to the clerk of the county court of the county where the taxpayer shall have been listed as delinquent. The clerk of the county court shall record the certificate in the book in which releases are recorded, without payment of any additional fee. From the date that such a certificate is admitted to record the land of the taxpayer in the county shall be free from any lien for taxes under this article accrued to the date that the certificate was issued.

Sec. 20. The tax commissioner may distrain upon any goods, chattels, or intangibles represented by negotiable evidences of indebtedness, of any taxpayer delinquent under this article for the amount of all taxes and penalties accrued and unpaid hereunder. The commissioner may require the assistance of the sheriff of any county of the state in levying such distress in the county of which such sheriff is an officer. A sheriff so collecting taxes due hereunder shall be entitled to compensation in the amount of all penalties collected over and above the principal amount of the tax due, but in no case shall such compensation exceed twenty-five dollars. All taxes and penalties so collected shall be reported within ten days after collection to the tax commissioner, who shall prescribe by general regulation the manner of remittance of such funds and of allowing the collecting officer the compensation due him under this section.

Sec. 21. It shall be unlawful for any person to refuse to make the return provided to be made in section five of this article; or to make any false or fraudulent return or false statement in any return, with intent to defraud the state or to evade the payment of the tax, or any part thereof, imposed by this article; or for any person to aid or abet another in any attempt to evade the payment of the tax, or any part thereof, imposed by this article; or for the president, vice president, secretary or treasurer of any corporation to make or permit to be made for any corporation or association any false return, or any false statement in any return required in this article, with the intent to evade the payment of any tax hereunder. And any person violating any of the provisions of this section shall be guilty of a misdemeanor and, on conviction thereof, shall be fined not more than one thou-

sand dollars or imprisoned not exceeding one year in the county jail or punished by both fine and imprisonment, at the discretion of the court, within the limitations aforesaid. In addition to the foregoing penalties, any person who shall knowingly swear to or verify any false or fraudulent return, or any return containing any false or fraudulent statement, with the intent aforesaid, shall be guilty of the offense of false swearing, and, on conviction thereof, shall be punished in the manner provided by law. Any corporation for which a false return, or a return containing a false statement, as aforesaid, shall be made, shall be guilty of a misdemeanor and shall be punished by a fine of not more than one thousand dollars. The circuit and criminal courts of the county in which the offender resides, or, if a corporation, in which it carries on business, shall have concurrent jurisdiction to enforce this section.

Sec. 22. The administration of this article is vested in and shall be exercised by the tax commissioner who shall prescribe forms and reasonable rules of procedure in conformity with this article for the making of returns and for the ascertainment, assessment and collection of the taxes imposed hereunder; and the enforcement of any of the provisions of this article in any of the courts of the state shall be under the exclusive jurisdiction of the tax commissioner, who shall require the assistance of and act through the prosecuting attorney of any county where suit is brought; but the prosecuting attorney of any county shall receive no fees or compensation for services rendered in enforcing this article in addition to the salary paid by the county to such officer.

Sec. 23. If a part of this article is for any reason declared unconstitutional, or otherwise invalid, the decision of the court shall not affect the validity of any remaining portion.

Article 12-A—Transportation Privilege Tax Law

Section 1. When used in this article the term "company" shall include any partnership, joint adventure, joint stock company or association.

The phrase "motor vehicle carrier" shall mean any person engaged in the transportation of passengers or property, or both, for compensation by motor propelled vehicle for the operation of which a permit or certificate of convenience or convenience and necessity is required by law.

The term "ton-mile" shall be a unit of transportation meaning transportation of one net ton in weight a distance of one mile.

The term "passenger-mile" means the transportation of one passenger a distance of one mile.

The term "car-mile" means the operation of a railroad car over a distance of one mile.

The term "barrel-mile" means the transportation of the equivalent of a barrel of oil a distance of one mile.

The phrase "one thousand cubic feet-mile" means the transportation of one thousand cubic feet of gas, measured at sixty degrees Fahrenheit and a pressure of thirty inches of mercury a distance of one mile.

The term "wire-mile" means the equivalent of a single metallic telephone or telegraph conductor one mile in length.

Sec. 2. Every railroad corporation doing business in the state shall pay an annual privilege tax for each calendar year for the privilege of doing business in the state. The tax shall be five-tenths of one per cent of the value of the total property, tangible and intangible, of the corporation in the state as determined by the assessment made during the calendar year by the board of public works for the purposes of the general property tax.

It is the purpose of this section to levy a privilege tax upon railroad corporations for the privilege of engaging in business conducted entirely within this state, and it is not intended to impose any tax or charge upon interstate or foreign commerce. The return required for purposes of the general property tax shall suffice for purposes of this section.

No public corporation of the state shall levy a license or privilege tax on the business taxed under this section.

Sec. 3. Every person or corporation operating a steamboat, steamship or other floating property for the transportation of passengers or freight, and doing business within the state shall pay to the state an annual privilege tax for each calendar year. The tax shall be two and one-half per cent of the gross income from business beginning and ending entirely within the state and a like percentage of its remaining gross income earned within the state, to be determined as follows:

Ascertain the total gross income from all business not confined to this state which begins, ends or passes through

the state and determine both the total ton-miles of freight so hauled and the ton-miles of such business actually done within the limits of this state. The tax shall be assessed against a sum bearing the proportion to the amount of gross income so determined that the ton-miles of such business done in this state bear to the total ton-miles of such business. This tax shall be in addition to all other license taxes or charges to which such taxpayers are subject under the law of this state, and shall be measured in terms of gross income for the year ending December thirty-first preceding.

Sec. 4. Every motor vehicle carrier operating on the public highways of this state and every railroad car corporation, express corporation or company, pipe line corporation, telephone and telegraph corporation doing business in the state shall pay to the state an annual privilege tax for each calendar year for the privilege of doing business in the state. This tax shall be equal to the gross income from all business beginning and ending within the state multiplied by the respective rates as follows: Motor vehicle carriers, railroad car corporations, express corporations or companies, one and one-half per cent; pipe line corporations, three and one-half per cent; telephone corporations two and three-fourths per cent; and telegraph corporations, five per cent.

Sec. 5. In addition to the tax imposed in the preceding sections, every motor vehicle carrier operating on the public highways of the state and every railroad corporation, railroad car corporation, express corporation or company, pipe line corporation, telephone and telegraph corporation doing business in this state shall pay an annual privilege tax for each calendar year for the privilege of doing business in the state, to be determined as follows:

(a) The tax as to motor vehicle carriers shall be equal to one and one-half per cent of the net income earned within the state, such income to be determined by ascertaining a sum bearing the proportion to the total net income from passenger and freight traffic that the business done in West Virginia, measured in passenger-miles of passengers carried in the state as to passenger traffic, and in ton-miles as to freight traffic, bears to all business done, measured in like fashion;

(b) The tax as to railroad corporations shall be equal to four per cent of the net income earned within the state, such

income to be determined by ascertaining a sum bearing the proportion to total net income of the corporation that its business done in West Virginia, measured in ton-miles, bears to all business done, measured in like fashion;

(c) The tax as to railroad car corporations and as to express corporations or companies shall be one and one-half per cent of net income earned within the state, such income to be determined by ascertaining a sum bearing the proportion to the total net income of the corporation or company that its business done in West Virginia, measured in car-miles of car operation, bears to all business done, measured in like fashion;

(d) The tax as to pipe line corporations shall be three and one-half per cent of net income earned within the state, such income to be determined by ascertaining a sum bearing the proportion to the total net income of the corporation that its business done in West Virginia, measured in barrel-miles in the case of oil and of thousand cubic feet-miles in the case of gas, bears to all business done, measured in like fashion;

(e) The tax as to telephone and telegraph corporations shall be two and three-fourths per cent of net income earned within the state as to telephone corporations, and five per cent as to telegraph corporations, such income to be determined by ascertaining a sum bearing the proportion to the total net income of the corporation that its business done in West Virginia, measured in wire-miles, bears to all business done, measured in like fashion;

(f) In computing the tax imposed by this section the total net income of a taxpayer, who shall have been taxed under the preceding section, shall be reduced by an amount bearing the proportion to such total net income that the gross income of the taxpayer which is the measure of the tax under the preceding section bears to its total gross income from all business done wherever conducted. This section shall not apply to a taxpayer taxed under the preceding section and engaged exclusively in business within this state.

Sec. 6. The taxpayer under this article shall file an annual return with the state tax commissioner upon a form prescribed by the commissioner setting out the following and such other information as that officer may deem necessary

or useful in aid of the assessment and computation of the tax:

(1) The gross income, from all business done within the state, namely, business beginning and ending entirely within the state;

(2) The total gross income of the business wherever conducted;

(3) The net income of the business wherever conducted. For this purpose the determination of net income for purposes of the net income tax due the government of the United States under the laws of the United States shall be taken as final;

(4) The total amount of business done in this state, measured in the units hereinbefore prescribed. The tax commissioner may designate a single month in the tax year as the period for which the amount of business done in this state, measured in the units hereinbefore prescribed, shall be reported and shall fix the total amount of business done in the state for the whole tax year by multiplying the amount determined for the designated month by twelve. For the tax period from the date this act takes effect through December thirty-first, one thousand nine hundred thirty-three, the tax commissioner may designate any month in that period for purposes hereof;

(5) The total amount of business done, wherever conducted, measured in the units hereinbefore prescribed.

Every return shall be signed and sworn to by the taxpayer, if a natural person, and if a corporation, shall be signed and sworn to by its president, vice president, secretary or principal accounting officer. A return may be made at the same time and as a supplement to the return required for purposes of the general property tax and the tax commissioner may make use of relevant information in both in assessing the tax imposed by this article.

Sec. 7. The assessment of taxes under this article and the returns required therefor shall be for the year ending on the thirty-first day of December. If the taxpayer in exercising a privilege taxable under this article, keeps the books reflecting the same on a basis other than the calendar year, he may, with the assent of the tax commissioner, make

his annual returns and pay taxes for the year covering his accounting period as shown by the method of keeping his books. In case of the exercise of a privilege taxable hereunder for a fractional part of a tax year, the tax shall be computed in like proportion to the tax for a full year.

Sec. 8. The total amount of tax imposed by this article shall be paid on or before the first day of April following the close of the calendar year, or if the return should be made on the basis of a taxpayer's fiscal year, then, on the first day of the fourth month following the close of the fiscal year. The taxpayer may by writing, filed with the tax commissioner, elect to pay the tax in four equal quarterly installments in which case the first installment shall be paid on the date hereinabove prescribed, the second installment shall be paid on the first day of the fourth month, the third installment shall be paid on the first day of the seventh month, and the fourth installment on the first day of the tenth month, after such date.

[fol. 36] Sec. 9. The tax imposed under this article shall be in addition to all license taxes or charges to which the privileges taxed herein are subject under the law of this state. It is the purpose of this article to rest a fair share of the tax burden, commensurate with the benefits received, upon those exercising privileges taxed hereby within this state.

Sec. 10. The amount of the tax imposed by this article shall be a debt due the state and shall be a lien on all the property and assets of the taxpayers within the state prior to all other liens and charges except the lien of property taxes with which the lien hereby created shall be on a parity. A penalty of one per cent per month shall be added to the amount of the tax for each month of delinquency and shall be secured by the lien herein provided.

Sec. 11. The tax commissioner shall, between the first and fifteenth day of February in every year, mail a notice of delinquency, together with a statement of the total amount of taxes and penalties due, to the last known postoffice address of each delinquent taxpayer. The cost of publication hereunder shall be paid by the tax commissioner, when allowed by the board of public works, out of the moneys in the treasury.

Not less than thirty days after giving notice of delinquency as provided in the preceding paragraph the tax commissioner shall certify to the secretary of state a list of all taxpayers delinquent under this article. The secretary of state shall preserve the list in his office and a certificate from him that any taxpayer mentioned in such certificate is delinquent in the payment of the tax imposed by this article shall be prima facie evidence thereof. Within thirty days after receipt of such certificate by the secretary of state it shall be the duty of the attorney general to institute a suit in equity in Kanawha county, in the name of the state, in which such delinquent taxpayers shall be made defendants. In the bill so filed it shall be sufficient to allege that the defendants have failed to pay taxes hereunder, and that each of them justly owes the state the amount of privilege tax and penalties stated therein, which amount shall be computed up to the first day of the month succeeding that in which the bill was filed. No such defendant shall plead that the tax commissioner failed to give notice as prescribed in this section.

If upon the hearing of such suit it shall appear to the court that any defendant has failed to pay any such tax and accrued penalties, the court shall enter a decree against such defendant for the amount due, including the costs of the proceeding or such portion thereof as the court shall apportion to be paid by such defendant. If the decree be not paid when made the court shall enter a decree forfeiting the charter, rights and franchise of such defendant, if it be a domestic corporation, revoking the franchises and privileges to hold property and transact business in the state, if it be a foreign corporation, and revoking all franchises, licenses and privileges to conduct the business engaged in if such defendant be an individual. The money decreed may be collected by the tax commissioner as other claims due the state are collected.

The court may on motion of the attorney general grant an injunction against any such defendant restraining the exercise of any privilege or the transaction of any business within the state until such decree including the costs be paid. When two or more taxpayers are included in one suit the court shall apportion the cost thereof among them as it may deem just.

Sec. 12. It shall be unlawful for any person to refuse to make the return required to be made by section six of this article; or to make any false or fraudulent return or false statement in any return, with intent to defraud the state or to evade the payment of the tax, or any part thereof, imposed by this article; or for any person to aid or abet another in any attempt to evade the payment of the tax, or any part thereof, imposed by this article; or for the president, vice president, secretary or treasurer of any corporation to make, or permit to be made, for any corporation or association any false return or any false statement in any return required in this article, with the intent to evade the payment of any tax hereunder. A person violating any of the provisions of this section shall be guilty of a misdemeanor, and, on conviction thereof, shall be fined not more than one thousand dollars or imprisoned not exceeding one year in the county jail or punished by both fine and imprisonment, at the discretion of the court, within the limitations aforesaid. In addition to the foregoing penalties, any person who shall knowingly swear to or verify any false or fraudulent return, or any return containing any false or fraudulent statement, with the intent aforesaid, shall be guilty of the offense of false swearing, and, on conviction thereof, shall be punished in the manner provided by law. Any corporation for which a false return, or a return containing a false statement as aforesaid shall be made, shall be guilty of a misdemeanor and may be punished by a fine of not more than one thousand dollars. The circuit and criminal courts of the county in which the offender resides, or, if a corporation, in which it carries on business, shall have concurrent jurisdiction to enforce this section.

Sec. 13. If a part of this article is for any reason declared unconstitutional, or otherwise invalid, the decision of the court shall not affect the validity of any remaining portion.

[fol. 37] Copy

PLAINTIFF'S EXHIBIT No. 2 TO BILL OF COMPLAINT

July 15, 1935.

Dravo Contracting Company, 302 Penn Ave., Pittsburgh, Pa.

Please Refer to File No. 56-608

GENTLEMEN:

I am enclosing herewith certified copies of gross sales tax returns and assessments made up in this office showing tax and penalty due the State of West Virginia in the amount of $135,761.51 for the years 1933 and 1934.

Unless this sum is paid immediately, I shall be forced to proceed in accordance with the law to collect same and to distrain on your property to collect said tax.

Yours very truly, —— ——, State Tax Commissioner.

WM:c
Enc.—

COPY

Form 201--Gross Sales License Tax. This return to be forwarded to STATE TAX COMMISSIONER, BOX 1216, CHARLESTON, W. VA.

STATE OF WEST VIRGINIA—ANNUAL RETURN—Gross Sales License Tax

(1) For Year Ended 1933 (2) or Part Year From 1/1 To 5/26

(3) Nature of Business Conducted Contracting

(4) Books of Account are Kept at (Post Office) Pittsburgh, Pa.

(5) Principal Place of Business or Chief Works in W. Va.

(6) Name and Address of Outside Expert (if employed) Preparing Return:

	FOR USE OF BUREAU ONLY
1	
2	Date Received
3	
4	Serial No.
5	Audited by
6	Amount Remitted $
7	Total
8	Am't and Date Assessed

Insert name and address and indicate by X the class to which you belong

56-608

Dravo Contracting Company,

Pittsburgh, Pa.

Returns without addressographed name and address MUST SHOW ANSWERS TO QUESTIONS 7 and 8.

Individual	
Corporation	
Partnership	
Association	
Trust	

(7) When business begun?

(8) Were returns filed for former years?

(9) Did you sell or otherwise dispose of your property, or quit business, during period covered by this return? —

(10) If so, when?

(10a) If business sold, to whom?

THIS RETURN WITH CHECK TO COVER TAXES DUE MUST BE RECEIVED WITHIN 30 DAYS FROM END OF PERIOD COVERED BY THE RETURN

(11) If a corporation, when incorporated?; (12) Under the laws of what state?; (13) When business begun?

(14) If a foreign corporation, when admitted to do business in West Virginia? (15) Did the corporation dissolve or quit business during the period covered by this return? (16) If so, when? (17) Did the corporation change its name during the period covered by this return? (18) If so, old name, (19) New Name

COMPUTATION OF TAX—BUSINESS CONDUCTED IN WEST VIRGINIA

(SEE DEFINITION OF GROSS INCOME AT FOOT OF PAGE 3, BEFORE PREPARING RETURN)

1. ITEM	2. GROSS AMOUNT	3. EXEMPTIONS	4. TAXABLE AMOUNT	5. RATE PER $100.00	6. AMOUNT
A. Gross value production: Coal 1	$	$	$	$ .42	
Oil 2				1.00	
Natural gas 3				1.85	
Other minerals and timber 4				.45	
B. Gross value manufacturers				.20	
C. Gross income of retailers and others. 1 (No deduction allowed a/c cost of purchases)				.05	
Gross income of wholesalers 2				.30	
D. Gross income: Banks 1				1.00	
Steam R. R.'s and pipe lines 2				.60	
Telephone, telegraph, express, electric light and power Companies 3				.40	
St. R. R.'s and other pub. utilities 4				.30	2092 78
E. Gross income, contracting business	701591 99	4000 00	697591 99	1.00	
F. Gross income, amusement businesses				.30	
G. Gross income, all other businesses					
H. Total amount of taxes due					$ 2092 78

I, Fred L. Fox, State Tax Commissioner, do hereby certify that this assessment of taxes due the State of West Virginia was based on facts and figures furnished by the Dravo Contracting Company and is believed to be a true assessment of the actual tax due.

Fred L. Fox
State Tax Commissioner.

PENALTIES FOR FAILURE TO PAY TAX IN FULL WITHIN 30 DAYS AFTER CLOSE OF TAX YEAR—5% FIRST 30 DAYS, AND 2% EACH SUCCEEDING 30 DAYS UNTIL PAID.

Note: Rates are shown in dollars and cents per $100.00

Penalty 274 33

I. PAYMENTS HERETOFORE MADE ON ESTIMATED RETURNS AS UNDER:

Total 2867 11

1st Qr. $ 2nd Qr. $ 3rd Qr. $ 4th Qr. $ Total $

(4th Quarterly return is required only from taxpayers who have applied for and have been granted an extension for the filing of Annual Return.)

J. Remittance enclosed to make up total tax due as per line H

K. Total to balance H $

THIS RETURN MUST BE VERIFIED BY OATH PRESCRIBED ON PAGE 4

THIS RETURN IS NOT COMPLETE UNTIL THE SUPPLEMENTARY SCHEDULE OR SCHEDULES CORRESPONDING WITH THE ITEM OR ITEMS ABOVE REPORTED BY THE TAXPAYER ARE FILLED IN

8-31-33—100M

38

69 74

ALL SCHEDULES OF THIS RETURN COVER THE PERIOD FROM.....TO.....

SCHEDULE A. (To be used by Miners and Producers of Coal, Oil, Gas and other Minerals, and Producers of Timber.) This schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been Completed by the making of the proper entries in columns 2 to 6 thereof.	(1) Total Output in Production Units		(2) Average Price per Unit	(3) AMOUNT Dollars	Cts.
(1) Taxable value, as per column 4, page 1	xxxxxxxxxxxxx	xxxx	xxxxxxxxx	$	
Add exemptions claimed as per column 3, page 1: (2) Specific exemption at rate of $10,000 annually	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(3) Cash discounts if shown on the face of invoices & actually deducted by customer	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(4) Freight charges included in Sales Proceeds (See Rule 6-A)	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(5) Total value of minerals or timber produced, and freight, as per column 2, page 1	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(6) Output, average price and gross sales proceeds, as shown by taxpayer's records					
(7) Output, average price and market value used in manufacturing, etc.					
(8) Total value of minerals or timber produced (Sum of Lines 6 & 7)	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		

(9) State highest and lowest prices obtained during period.....Units used, long or short ton, etc.....

(10) State seam of coal mined.....Grade of oil produced.....Kind of Timber.....

Note—Average price to be based on prices f. o. b. without deduction for selling or other expense, commissions paid agents out of selling price, losses on account of bad debts or other causes.

Note—Report Commissary Business under schedule C; rentals, etc., under schedule G.

SCHEDULE B. (To be used by Manufacturers, Compounders and Persons Preparing Articles for Sale, Profit, or Use.) This schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been Completed by the making of the proper entries in columns 2 to 6 thereof.	(1) Total Output in Production Units		(2) Average Price per Unit	(3) AMOUNT Dollars	Cts.
(1) Taxable value as per column 4, page 1	xxxxxxxxxxxxx	xxxx	xxxxxxxxx	$	
Add exemptions claimed as per column 3, page 1: (2) Specific exemption at rate of $10,000 annually	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(3) Cash discounts if shown on the face of invoices and deducted by customer	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(4) Trade discounts, if allowed and deducted on face of invoices	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(5) Market value of product reported under Item A (See Rule 9-C)	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(6) Total output, average price and gross sales proceeds, as shown by records of taxpayer (enter 1, 2, 3, the amount in col. 3 to be the sum of items 1,2,3,4 and 5 above)					
(7) Freight charges included in taxpayer's invoices to customers exempted under Rule 6-B	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		
(8) Total Gross Sales Proceeds, as shown by invoices, as per column 2, page 1	xxxxxxxxxxxxx	xxxx	xxxxxxxxx		

(9) What production unit is used?.....

(10) If units are not uniform, show production and average price per unit, based on standard production units, if used.....

(11) State highest and lowest price per standard unit obtained.....

Note—Average price to be based on prices f. o. b. factory without deduction for commissions or other expense, or losses on account of bad debts or other causes.

SCHEDULE C. (To be used by all Persons engaged in the business of Selling Tangible Property) This schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been Completed by the making of the proper entries in columns 2 to 6 thereof.	AMOUNT Dollars	Cts.
(1) Taxable Gross Income of business, as per column 4, page 1	$	
Add exemptions claimed as per column 3, page 1: (2) Specific exemption at rate of $10,000 annually		
(3) Cash discounts shown on face of invoices and deducted by customer		
(4) Freight charges included in taxpayer's invoices to customers (See Rule 6-C)		
(5) Trade discounts if allowed and deducted on face of invoices		
(6) Total Gross Income of business, as per column 2, page 1 (See definition foot of page 3)		

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ALL SCHEDULES OF THIS RETURN COVER THE PERIOD FROM..... TO.....

SCHEDULE D. (Gross Income [See definition at foot of page 3] of banks, steam railroads, street railroads, oil and gas pipe lines, telephone, telegraph, express, electric light and power companies, and other public utilities). This schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been Completed by the making of the proper entries in columns 2 to 6 thereof.	AMOUNT
(1) Taxable Gross Income as per column 4, page 1	$
Add exemptions claimed, as per column 3, page 1:	
(2) Specific exemption at rate of $10,000 annually	
(3) Cash discounts if shown on face of invoices and deducted by customers	
(4) Gross Income from interstate business	
(5) Total Gross Income as shown by Taxpayer's records, as per column 2, page 1, (See definition foot of page)	

SCHEDULE E. (Gross Income of All Persons Engaged in the business of contracting. See definition of gross income at foot of page 3). This schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been Completed by the making of the proper entries in columns 2 to 6 thereof.	AMOUNT
(1) Taxable amount as per column 4, page 1	$
Add exemptions claimed, as per column 3, page 1:	
(2) Specific exemption at rate of $10,000 annually	
(3) Cash discounts if shown on face of invoices and deducted by customers	
(4) Total Gross Income, as shown by records of Taxpayer, as per column 2, page 1 (See definition foot of page)	

SCHEDULE F. (Gross Income—See definition, page 3) of persons engaged in amusement businesses, as defined under the Act. (See instructions page 4, Item F.) This schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been Completed by the making of the proper entries in columns 2 to 6 thereof.	AMOUNT
(1) Taxable amount as per column 4, page 1	$
Add exemptions claimed, as per column 3, page 1:	
(2) Specific exemption at rate of $10,000 annually	
(3) Cash discounts if shown on face of invoices and deducted by customers	
(4) Total Gross Income (See definition of Gross Income below as shown by records of Taxpayer, as per col. 2, page 1)	

SCHEDULE G. (Gross Income—See definition, page 3 of all persons engaged in business not included in the preceding schedules). This schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been Completed by the making of the proper entries in columns 2 to 6 thereof.	AMOUNT
(1) Taxable amount as per column 4, page 1	$
Add exemptions claimed, as per column 3, page 1:	
(2) Specific exemption at rate of $10,000 annually	
(3) Cash discounts if shown on face of invoices and deducted by customers	
(4) Total Gross Income (See definition below) as shown by records of Taxpayer, as per column 2, page 1	

NOTE—Taxpayers required to report under Schedule G comprise businesses consisting (a) in the sale of service, such as agencies, brokerage business, home insurance companies, investment companies, renting of real estate, garage rentals, etc., and (b) in the sale of service and tangible property combined, such as restaurants, automobile repair business, undertaking, plumbing, etc. Where the business consists of the sale of tangible property and the repairs or other service performed is incidental to the main business the gross income arising from the service is to be included in the taxable gross income reported under Schedule C—Business of Selling Tangible Property.

"Gross Income," as defined under section 1 of the act, means the value proceeding or accruing from the sale of tangible property (real or personal) or service, or both, and all receipts, actual or accrued by reason of the investment of the capital of the business engaged in, including interest, discount, rentals, royalties, fees, or other emoluments however designated and without any deduction on account of the cost of property sold, cost of materials used, labor costs, interest or discount paid, or any other expense whatsoever; and without any deductions on account of losses.

INSTRUCTIONS AS TO ANNUAL RETURNS
WHO SHALL MAKE ANNUAL RETURNS UNDER THE GROSS SALES LICENSE TAX LAW

(1) All corporations and associations organized and existing under the laws of the State of West Virginia.

(2) All foreign corporations admitted to do business in the State of West Virginia.

(3) All individuals, firms, co-partnerships, joint adventures, trusts or any other group or combination acting as a unit, engaged in business in the State of West Virginia.

Note:—Corporations, foreign and domestic, associations, individuals, firms, co-partnerships, joint adventures, trusts or any other group or combination acting as a unit engaged in business are required under the Rules and Regulations to make returns regardless of whether their gross value, gross sales proceeds or gross income amount to over $10,000.00 or not, or, in the case of corporations, whether or not any or all of the business is conducted outside of West Virginia.

CONCERNING THE SPECIFIC EXEMPTION OF $10,000.00

In addition to other exemptions provided in the act for certain classes of taxpayers, (See Schedules on page 2 and 3 of this form), a specific exemption at the rate of $10,000.00 annually is allowed each taxpayer and is to be deducted from his gross proceeds of sales, gross value or gross income, before computation of the tax is made. The application of this exemption depends upon the subject of the tax. Following the act, the subjects of tax, in order, are shown below, under the heading "Concerning Manner of Preparation of Annual Return."

The above exemption is allowable from the gross value, gross sales proceeds or gross income, as the case may be, derived from a full year's business. If the return covers a period of less than a year, the taxpayer is entitled to an exemption of that part of the sum of $10,000.00 which bears the same relation to $10,000.00 as the period of time during which he is engaged in business bears to a full year —in other words, the exemption is $833.33 for each month covered by the return.

CONCERNING MANNER OF PREPARATION OF ANNUAL RETURN

The annual return must show the actual amount of gross value, gross sales proceeds or gross income, as the case may be. The amount reported must be derived from the records of the taxpayer, subject to verification, if deemed necessary by the State Tax Commissioner.

The word "taxpayer," as used below, means any person, (See heading above, "Who Shall Make Annual Returns Under the Gross Sales License Tax Law"), liable for any tax under the Gross Sales License Tax Law.

ITEM A. The privilege of engaging or continuing within this state in the business of mining and producing for sale, profit, or use, any coal, oil, natural gas, limestone. sand or other mineral products, or felling and producing timber for sale, profit, or use.

ITEM B. The privilege of engaging or continuing within this state in the business of manufacturing, compounding or preparing for sale any articles, substances or commodities for sale, profit or use.

ITEM C. The privilege of engaging or continuing within this state in the business of selling any tangible property.

ITEM D. The privilege of engaging or continuing within this state in the business of banking, operating steam railroad, street railroad, oil and gas pipe lines, telephone, telegraph, express, electric light and power companies and other public service companies.

ITEM E. The privilege of engaging or continuing within this state in the business of contracting.

ITEM F. The privilege of engaging or continuing within this state in the business of operating a theatre, opera house, moving picture show, vaudeville, amusement park, dance hall, skating rink, race track, or any other place at which amusements are offered the public.

ITEM G. The privilege of engaging or continuing within this state in any other business not included in the preceding Items.

WHEN ANNUAL RETURN IS TO BE FILED. The annual return must be made and filed within thirty days from the end of the "tax year." For good cause shown in any particular case the tax commissioner may on application of the taxpayer extend the time for filing the annual return for a reasonable period. In all cases in which the taxpayer for any reason cannot complete and file his annual return within the time prescribed by law, that is, within thirty days from the close of the "tax year," prompt application within said thirty day period should be made to the tax commissioner for an extension of time. Any such application must state fully the reasons why the said return cannot be made within the period prescribed by the act. In all cases wherein extensions are allowed for the filing of Annual Returns a fourth quarterly estimated return will be required accompanied by remittance for the estimated amount of taxes due.

IF THE SPACE ON THIS RETURN IS INSUFFICIENT TO ENTER ALL PROPER ITEMS OR NOTATIONS, SEPARATE SHEETS CONTAINING THE NECESSARY INFORMATION SHOULD BE ATTACHED; WHEN SO ATTACHED, THEY BECOME A PART OF THIS RETURN.

OATH

I, ... do solemnly swear that the statements and items (both as to designations and amounts), entered in the foregoing return and in the supplementary statement and in any additional list or lists attached to or accompanying this return, are, to the best of my knowledge and belief, true and correct in each and every particular; that the figures thereon reported were taken from the orginal books, papers and records of the taxpayer making return; and that the person signing the return is thoroughly familiar with the business reported in the return and with the original books, papers and records from which the return was prepared; and that IN REPORTING GROSS INCOME NO DEDUCTIONS WERE MADE ON ACCOUNT OF COST OF GOODS OR LABOR OR OTHER EXPENSES OR LOSSES.

Sworn to and subscribed before me this.....day of....., 19..... .....
(Name of Taxpayer)

(Seal of Officer Taking Affidavit) .....
Notary Public.

.....
(Official title, if made on behalf of a corporation: president, vice-president, secretary or treasurer, as the case may be).

My commission expires on the.....day of ....., 19.....

41

COPY

FORM 301—GROSS SALES TAX. This return to be forwarded to STATE TAX COMMISSIONER, BOX 1216, CHARLESTON, W. VA.

State of West Virginia—Annual Return—Gross Sales Tax

(1) For Year Ended 1935 or (2) From May 27 To Dec. 31

(3) If Fiscal Year is Used, When Does Year End?

(4) Books of Account are Kept at (Post Office) Pittsburgh, Pa.

(5) Principal Place of Business or Chief Works in W. Va.

(6) Nature of Business Conducted Contracting

		[DO NOT USE THIS SPACE]
Check		
Certified Draft		
Money Order		
Bank Check		

56-606

Dravo Contracting Company,

Pittsburgh, Pa.

Individual	
Corporation	
Partnership	
Association	
Trust	

(7) When business begun?

(8) Were returns filed for former years?

(9) Did you sell or otherwise dispose of your property, or quit business, during period covered by this return?

(9a) If so, when?

(10) If business sold, to whom?

THIS RETURN WITH CHECK TO COVER TAXES DUE MUST BE RECEIVED WITHIN 30 DAYS FROM END OF PERIOD COVERED THEREBY.

(11) Incorporated under the laws of ; (12) Date ; (13) If a foreign corporation, when admitted to do business in West Virginia? ; (14) If business sold, to whom? ;

(15) Was name changed? ; (16) Old name ; (17) New name ;

(18) If a partnership, give names of all partners:

COMPUTATION OF TAX

1. ITEM	2. GROSS AMOUNT	3. EXEMPTIONS Detail Schedule Must Accompany Return.	4. TAXABLE AMOUNT	5. Rate Per $100	6. Surtax Per $100	7. Total	8. AMOUNT
A. Gross sales value production: Coal 1	$	$	$	$1.00	$ .50	$1.50	$
Sand, gravel or other mineral product not quarried or mined; oil, blast furnace slag 2				3.00	1.50	4.50	
Natural gas (exemptions include deduction of $5,000 annually) 3				6.00	3.00	9.00	
Limestone or sandstone quarried or mined, and timber 4				1.50	.75	2.25	
Other natural resource products 5				3.00	1.50	4.50	
B. Gross sales value manufactured products 1				.30	.15	.45	
C. Gross income of Retailers and others; Gross income of Wholesalers — No deduction allowed a/c cost of purchases 1				.75	No Surtax	.75	
C. Gross income of Retailers and others; Gross income of Wholesalers — No deduction allowed a/c cost of purchases 2				.15	.07½	.22½	
D. Gross income: Street, Interurban, and Electric Railways 1				1.00	.50	1.50	
D. Gross income: Electric Light and Power Companies (sales and demand charges domestic purposes and com'l lighting); Water Companies 2				4.00	2.00	6.00	
D. Gross income: Electric Light and Power Companies (all other sales and demand charges); Natural Gas Companies; Toll Bridges 3				3.00	1.50	4.50	
D. Gross income: All Other Public Utilities (except telegraph and telephone companies, railways, and other transportation companies) 4				2.00	1.00	3.00	
E. Contracting business—gross income	1501344 67		1501344 67	2.00	No Surtax	2.00	30026 89
F. Banking—gross income				.50	No Surtax	.50	
G. Amusement businesses—gross income				1.50	.75	2.25	
H. All other business—gross income				1.00	No Surtax	1.00	

I, Fred L. Fox, State Tax Commissioner, do hereby certify that this assessment of taxes due the State of West Virginia was based on facts and figures furnished by the Dravo Contracting Company and also believed to be a true assessment of the actual tax due.

Fred L. Fox
State Tax Commissioner.

J. TOTAL AMOUNT OF TAXES DUE	$	30026 89
Less exemption at rate of $25 annually or at the rate of $2.08 per month for the period actually engaged in business	$	15 00
K. TAXES DUE LESS EXEMPTION	$	30011 89
L. PAYMENTS HERETOFORE MADE ON ESTIMATED RETURNS AS UNDER: 1st Quarter $; 2d Quarter $; 3d Quarter $ Total	$	30011 89
PENALTIES	$	6502 50
M. REMITTANCE ENCLOSED to cover balance due	$	36514 39

THIS RETURN MUST BE VERIFIED BY OATH PRESCRIBED ON PAGE 4

THIS RETURN IS NOT COMPLETE UNTIL THE SUPPLEMENTARY SCHEDULE OR SCHEDULES CORRESPONDING WITH THE ITEM OR ITEMS ABOVE REPORTED BY THE TAXPAYER ARE FILLED IN.

10-34 100M

42 53

All Schedules of This Return Cover the Period from _____ to _____

SCHEDULE A. (To be used by Miners and Producers of Coal, Oil, Gas, and other Minerals, Blast Furnace Slag, and Producers of Timber.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	(1) Total Output in Production Units	(2) Average Price Per Unit	(3) AMOUNT Dollars	(3) AMOUNT Cts.
(1) Taxable value, as shown by column 4, page 1	x x x x x x x	x x x x x	$	
ADD: (2) Exemptions claimed, as shown by column 3, page 1	x x x x x x x	x x x x x		
ITEMIZE EXEMPTIONS:				
(3) Output, average price, and gross sales proceeds				
(4) Output, average price, and market value used in manufacturing, etc.				
(5) Total output, average price, sales proceeds and market value [sum of (3) and (4)]				

(6) State highest and lowest prices obtained during period _____ (7) Units used (long or short ton, etc.) _____

(8) State Seam of Coal mined _____ (9) Grade of oil produced _____ (10) Kind of Timber _____

[Note—Average price to be based on prices f.o.b. without deduction for commissions paid agents out of selling price, royalties paid, or other expenses.]

SCHEDULE B. (To be used by Manufacturers, Compounders and Persons Preparing Articles for Sale, Profit, or Use.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	(1) Total Output in Production Units	(2) Average Price Per Unit	(3) AMOUNT Dollars	(3) AMOUNT Cts.
(1) Taxable value, as shown by column 4, page 1	x x x x x x x	x x x x x	$	
ADD: (2) Exemptions claimed, as shown by column 3, page 1	x x x x x x x	x x x x x		
ITEMIZE EXEMPTIONS:				
(3) Total output, average price, and gross sales proceeds, as per column 2, page 1				
(4) Freight charges, if any, included in taxpayer's invoices to customers	x x x x x x x	x x x x x		
(5) Total Gross Sales Proceeds, **as shown by invoices**, as per column 2, page 1	x x x x x x x	x x x x x		

SCHEDULE C. (To be used by all persons engaged in the business of Selling Tangible Property.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable Gross Income, as shown by column 4, page 1	$	
ADD: (2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Freight charges, if any, included in taxpayer's invoices to customers		
(4) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE D. (To be used by Street, Interurban and Electric Railways, Water Companies, Electric Light and Power Companies, Natural Gas Companies, Toll Bridge Companies, Manufactured Gas Companies, Ferry Companies, and Sewerage Companies.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable Gross Income, as shown by column 4, page 1	$	
ADD: (2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

All Schedules of This Return Cover the Period from _____ **to** _____

SCHEDULE E. (To be used by persons engaging or continuing in the business of Contracting.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE F. (To be used by persons engaging or continuing in the business of Banking.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE G. (To be used by persons engaging or continuing in the business of operating a Theatre, Opera House, Moving Picture Show, Vaudeville, Amusement Park, Dance Hall, Skating Rink, Race Track, Radio Broadcasting Station, or any other place at which amusements are offered to the public.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE H. (To be used by persons engaging or continuing in any service business not specifically taxed under the preceding Schedules.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

INSTRUCTIONS AS TO ANNUAL RETURNS

1. PERSONS REQUIRED TO FILE ANNUAL RETURNS

(a) All corporations and associations organized and existing under the laws of the State of West Virginia.

(b) All foreign corporations admitted to do business in the State of West Virginia.

(c) All individuals, firms, co-partnerships, joint adventures, trusts or any other group or combination acting as a unit, engaged in business in the State of West Virginia.

(**Note:** Corporations, foreign and domestic, associations, individuals, firms, co-partnerships, joint adventures, trusts or any other group or combination acting as a unit engaged in business in West Virginia are required, under the Rules and Regulations, to make returns regardless of whether the amount of business done requires the payment of a tax, or in the case of corporations, whether or not any or all of the business is conducted outside of West Virginia.

2. EXEMPTIONS AND DEDUCTIONS ALLOWED

(1) Cash discounts allowed and taken on sales. (2) Proceeds of sale of goods, wares or merchandise returned by customers when the sale price is refunded either in cash or by credit. (3) Sale price of any article accepted as part payment on any new article sold, if the full sale price of the new article is included in the "gross income" or "gross proceeds of sales." (4) Amount of the tax paid by natural gas utilities under Item A-3 (production) allowed as a deduction from gross income from all sales to consumers. (5) In the case of public utilities, gross income derived from commerce between this state and other states of the United States, or between this state and foreign countries. (6) In the case of natural gas producers, an exemption of $5,000.00 annually, to be deducted from value as shown by gross sales proceeds. (7) Twenty-five dollars in amount of tax computed under Items A to H, inclusive, only one exemption being allowed to any one person whether he exercise one or more privileges. If the privilege is exercised for a part of a tax year, the exemption is reduced in proportion.

3. CLASSIFICATION OF BUSINESS ACTIVITIES

ITEM A. Every person engaging or continuing within West Virginia in the business of producing for sale, profit or commercial use any natural resource products shall report under ITEM A (1 to 5) the gross proceeds of sales (and/or sales value where no sale is made), of all natural resource products mined or produced for sale, profit, or commercial use.

ITEM B. Every person engaging or continuing within West Virginia in the busines of manufacturing, compounding, or preparing for sale, profit or commercial use, either directly or through the activity of others, in whole or in part, any article or articles, substance or substances, commodity or commodities, shall report under ITEM B the gross proceeds of sales (and/or sales value where no sale is made), of all such articles, etc., manufactured, compounded or prepared for sale, profit, or commercial use.

ITEM C. Every person engaging or continuing within West Virginia in the business of selling any tangible property whatsoever, real or personal, shall report under ITEM C (1 and/or 2) the "gross income" of the business. (See definition of "gross income" below.)

ITEM D. Every person engaging or continuing in West Virginia in the following utility businesses, viz: Street, interurban, and electric railways, electric light and power companies, water companies, natural gas distributors, toll bridge companies, and all other public utilities, **except telegraph and telephone companies, railways, and other transportation companies taxed under Article 12-A,** shall report under ITEM D (1 to 4) the "gross income" of the business. (See definition of "gross income" below.)

ITEM E. Every person engaging or continuing within West Virginia in the business of contracting shall report under ITEM E the "gross income" of the business. (See definition of "gross income" below.)

ITEM F. Every person engaging or continuing within West Virginia in the business of banking shall report under ITEM F the "gross income" of the business. (See definition of "gross income" below.)

ITEM G. Every person engaging or continuing within West Virginia in the business of operating a theater, opera house, moving-picture show, vaudeville, amusement park, dance hall, skating rink, race track, radio broadcasting station, or any other place at which amusements are offered to the public, shall report under ITEM G the "gross income" of the business. (See definition of "gross income" below.)

ITEM H. Every person engaging or continuing within West Virginia in any service business or calling not otherwise specifically taxed shall report under ITEM H the "gross income" of the business. (See definition of "gross income" below.)

4. DEFINITION OF THE TERM "GROSS INCOME"

"Gross income" means the gross receipts of the taxpayer derived from trade, business, commerce or sales and the value proceeding or accruing from the sale of tangible property (real or personal), or service, or both, and all receipts by reason of the investment of the capital of the business engaged in, including interest, discount, rentals, royalties, fees or other emoluments however designated and without any deductions on account of the cost of property sold, the cost of materials used, labor costs, taxes, royalties, interest or discount paid or any other expense whatsoever.

IF THE SPACE ON THIS RETURN IS INSUFFICIENT TO ENTER ALL PROPER ITEMS OR NOTATIONS, SEPARATE SHEETS CONTAINING THE NECESSARY INFORMATION SHOULD BE ATTACHED; WHEN SO ATTACHED, THEY BECOME A PART OF THIS RETURN.

OATH

I, _____, do solemnly swear that the statements and items (both as to designations and amounts) entered in the foregoing return and in the supplementary statment and in any additional list or lists attached to or accompanying this return are to the best of my knowledge and belief, true and correct in each and every particular; that the figures thereon reported were taken from the original books, papers and records of the taxpayer making return; and that the person signing the return is thoroughly familiar with the business reported in the return and with the original books, papers and records from which the return was prepared; and that IN REPORTING GROSS INCOME NO DEDUCTIONS WERE MADE ON ACCOUNT OF COST OF GOODS OR LABOR OR OTHER EXPENSES.

Sworn to and subscribed before me this _____ day of _____, 19_____. _____
(Name of Taxpayer)

{ Seal of Officer } { Taking Affidavit } _____ Notary Public.

_____
(Official Title, if made on behalf of a corporation: President, Vice-President, Secretary or Treasurer, as the case may be.)

My commission expires on the _____ day of _____, 19_____.

COPY

FORM 301—GROSS SALES TAX. This return to be forwarded to STATE TAX COMMISSIONER, BOX 1216, CHARLESTON, W. VA.

State of West Virginia—Annual Return—Gross Sales Tax

(1) For Year Ended Dec. 31, 1934 or (2) From _____ To _____

(3) If Fiscal Year is Used, When Does Year End? _____

(4) Books of Account are Kept at (Post Office) Pittsburgh, Pa.

(5) Principal Place of Business or Chief Works in W. Va. _____

(6) Nature of Business Conducted Contracting

Check	
Certified Draft	
Money Order	
Bank Check	

[DO NOT USE THIS SPACE]

56-608

Dravo Contracting Company,

Pittsburgh, Pa.

Individual	
Corporation	
Partnership	
Association	
Trust	

(7) When business begun? _____

(8) Were returns filed for former years? _____

(9) Did you sell or otherwise dispose of your property, or quit business, during period covered by this return? _____

(9a) If so, when? _____

(10) If business sold, to whom? _____

THIS RETURN WITH CHECK TO COVER TAXES DUE MUST BE RECEIVED WITHIN 30 DAYS FROM END OF PERIOD COVERED THEREBY.

(11) Incorporated under the laws of _____; (12) Date _____; (13) If a foreign corporation, when admitted to do business in West Virginia? _____; (14) If business sold, to whom? _____;

(15) Was name changed? _____; (16) Old name _____; (17) New name _____;

(18) If a partnership, give names of all partners: _____

COMPUTATION OF TAX

1. ITEM	2. GROSS AMOUNT	3. EXEMPTIONS Detail Schedule Must Accompany Return.	4. TAXABLE AMOUNT	5. Rate Per $100	6. Surtax Per $100	7. Total	8. AMOUNT
A. Gross sales value production: Coal 1	$	$	$	$1.00	$ .50	$1.50	$
Sand, gravel or other mineral product not quarried or mined; oil, blast furnace slag 2				3.00	1.50	4.50	
Natural gas (exemptions include deduction of $5,000 annually) 3				6.00	3.00	9.00	
Limestone or sandstone quarried or mined, and timber 4				1.50	.75	2.25	
Other natural resource products 5				2.00	1.00	3.00	
B. Gross sales value manufactured products				.30	.15	.45	
C. Gross Income of Retailers and others (No deduction allowed a/c cost of purchases) 1				.75	No Surtax	.75	
Gross Income of Wholesalers (No deduction allowed a/c cost of purchases) 2				.15	.07½	.22½	
D. Gross Income: Street, Interurban, and Electric Railways 1				1.00	.50	1.50	
Electric Light and Power Companies (sales and demand charges domestic purposes and com'l lighting); Water Companies 2				4.00	2.00	6.00	
Electric Light and Power Companies (all other sales and demand charges); Natural Gas Companies; Toll Bridges 3				3.00	1.50	4.50	
All Other Public Utilities (except telegraph and telephone companies, railways, and other transportation companies) 4				2.00	1.00	3.00	
E. Contracting business—gross income	4431525 63		4431525 63	2.00	No Surtax	2.00	88630 51
F. Banking—gross income				.50	No Surtax	.50	
G. Amusement businesses—gross income				1.50	.75	2.25	
H. All other business—gross income				1.00	No Surtax	1.00	

I, Fred L. Fox, State Tax Commissioner, do hereby certify that this assessment of taxes due the State of West Virginia was based on facts and figures furnished by the Dravo Contracting Company and is believed to be a true assessment of the actual tax due.

Fred L. Fox
State Tax Commissioner.

J. TOTAL AMOUNT OF TAXES DUE	$ 88630 51
Less exemption at rate of $25 annually or at the rate of $2.08 per month for the period actually engaged in business	$ 25 00
K. TAXES DUE LESS EXEMPTION	$ 88605 51
L. PAYMENTS HERETOFORE MADE ON ESTIMATED RETURNS AS UNDER: 1st Quarter $_____; 2d Quarter $_____; 3d Quarter $_____ Total	$ 88605 51
PENALTIES	$ 7974 50
M. REMITTANCE ENCLOSED to cover balance due	$ 96580 01

THIS RETURN MUST BE VERIFIED BY OATH PRESCRIBED ON PAGE 4

THIS RETURN IS NOT COMPLETE UNTIL THE SUPPLEMENTARY SCHEDULE OR SCHEDULES CORRESPONDING WITH THE ITEM OR ITEMS ABOVE REPORTED BY THE TAXPAYER ARE FILLED IN.

10-34 100M

45

All Schedules of This Return Cover the Period from _____ **to** _____

SCHEDULE A. (To be used by Miners and Producers of Coal, Oil, Gas, and other Minerals, Blast Furnace Slag, and Producers of Timber.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	(1) Total Output in Production Units	(2) Average Price Per Unit	(3) AMOUNT Dollars	(3) AMOUNT Cts.
(1) Taxable value, as shown by column 4, page 1	x x x x x x x x	x x x x x	$	
ADD:				
(2) Exemptions claimed, as shown by column 3, page 1	x x x x x x x x	x x x x x		
ITEMIZE EXEMPTIONS:				
(3) Output, average price, and gross sales proceeds				
(4) Output, average price, and market value used in manufacturing, etc.				
(5) Total output, average price, sales proceeds and market value [sum of (3) and (4)]				

(6) State highest and lowest prices obtained during period _____ (7) Units used (long or short ton, etc.) _____

(8) State Seam of Coal mined _____ (9) Grade of oil produced _____ (10) Kind of Timber _____

[Note—Average price to be based on prices f.o.b. without deduction for commissions paid agents out of selling price, royalties paid, or other expenses.]

SCHEDULE B. (To be used by Manufacturers, Compounders and Persons Preparing Articles for Sale, Profit, or Use.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	(1) Total Output in Production Units	(2) Average Price Per Unit	(3) AMOUNT Dollars	(3) AMOUNT Cts.
(1) Taxable value, as shown by column 4, page 1	x x x x x x x x	x x x x x	$	
ADD:				
(2) Exemptions claimed, as shown by column 3, page 1	x x x x x x x x	x x x x x		
ITEMIZE EXEMPTIONS:				
(3) Total output, average price, and gross sales proceeds, as per column 2, page 1				
(4) Freight charges, if any, included in taxpayer's invoices to customers	x x x x x x x x	x x x x x		
(5) Total Gross Sales Proceeds, **as shown by invoices,** as per column 2, page 1	x x x x x x x x	x x x x x		

SCHEDULE C. (To be used by all persons engaged in the business of Selling Tangible Property.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable Gross Income, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed as shown by column 3, page 1		
ITEMIZE EXEMPTIONS		
(3) Freight charges, if any, included in taxpayer's invoices to customers		
(4) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE D (To be used by Street, Interurban and Electric Railways, Water Companies, Electric Light and Power Companies, Natural Gas Companies, Toll Bridge Companies, Manufactured Gas Companies, Ferry Companies, and Sewerage Companies.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable Gross Income, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

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All Schedules of This Return Cover the Period from ..... to .....

SCHEDULE E. (To be used by persons engaging or continuing in the business of Contracting.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE F. (To be used by persons engaging or continuing in the business of Banking.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE G. (To be used by persons engaging or continuing in the business of operating a Theatre, Opera House, Moving Picture Show, Vaudeville, Amusement Park, Dance Hall, Skating Rink, Race Track, Radio Broadcasting Station, or any other place at which amusements are offered to the public.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

SCHEDULE H. (To be used by persons engaging or continuing in any service business not specifically taxed under the preceding Schedules.)

This Schedule is to be prepared after COMPUTATION OF TAXES, page 1, has been completed by the making of the proper entries in columns 2 to 8 thereof.

	AMOUNT Dollars	AMOUNT Cts.
(1) Taxable amount, as shown by column 4, page 1	$	
ADD:		
(2) Exemptions claimed, as shown by column 3, page 1		
ITEMIZE EXEMPTIONS:		
(3) Total Gross Income (see definition on page 4) of business, as shown by column 2, page 1		

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INSTRUCTIONS AS TO ANNUAL RETURNS

1. PERSONS REQUIRED TO FILE ANNUAL RETURNS

(a) All corporations and associations organized and existing under the laws of the State of West Virginia.

(b) All foreign corporations admitted to do business in the State of West Virginia.

(c) All individuals, firms, co-partnerships, joint adventures, trusts or any other group or combination acting as a unit, engaged in business in the State of West Virginia.

(**Note:** Corporations, foreign and domestic, associations, individuals, firms, co-partnerships, joint adventures, trusts or any other group or combination acting as a unit engaged in business in West Virginia are required, under the Rules and Regulations, to make returns regardless of whether the amount of business done requires the payment of a tax, or in the case of corporations, whether or not any or all of the business is conducted outside of West Virginia.

2. EXEMPTIONS AND DEDUCTIONS ALLOWED

(1) Cash discounts allowed and taken on sales. (2) Proceeds of sale of goods, wares or merchandise returned by customers when the sale price is refunded either in cash or by credit. (3) Sale price of any article accepted as part payment on any new article sold, if the full sale price of the new article is included in the "gross income" or "gross proceeds of sales." (4) Amount of the tax paid by natural gas utilities under Item A-3 (production) allowed as a deduction from gross income from all sales to consumers. (5) In the case of public utilities, gross income derived from commerce between this state and other states of the United States, or between this state and foreign countries. (6) In the case of natural gas producers, an exemption of $5,000.00 annually, to be deducted from value as shown by gross sales proceeds. (7) Twenty-five dollars in amount of tax computed under Items A to H, inclusive; only one exemption being allowed to any one person whether he exercise one or more privileges. If the privilege is exercised for a part of a tax year, the exemption is reduced in proportion.

3. CLASSIFICATION OF BUSINESS ACTIVITIES

ITEM A. Every person engaging or continuing within West Virginia in the business of producing for sale, profit or commercial use any natural resource products shall report under ITEM A (1 to 5) the gross proceeds of sales (and/or sales value where no sale is made), of all natural resource products mined or produced for sale, profit, or commercial use.

ITEM B. Every person engaging or continuing within West Virginia in the business of manufacturing, compounding, or preparing for sale, profit or commercial use, either directly or through the activity of others, in whole or in part, any article or articles, substance or substances, commodity or commodities, shall report under ITEM B the gross proceeds of sales (and/or sales value where no sale is made), of all such articles, etc., manufactured, compounded or prepared for sale, profit, or commercial use.

ITEM C. Every person engaging or continuing within West Virginia in the business of selling any tangible property whatsoever, real or personal, shall report under ITEM C (1 and/or 2) the "gross income" of the business. (See definition of "gross income" below.)

ITEM D. Every person engaging or continuing in West Virginia in the following utility businesses, viz: Street, interurban, and electric railways, electric light and power companies, water companies, natural gas distributors, toll bridge companies, and all other public utilities, **except telegraph and telephone companies, railways, and other transportation companies taxed under Article 12-A,** shall report under ITEM D (1 to 4) the "gross income" of the business. (See definition of "gross income" below.)

ITEM E. Every person engaging or continuing within West Virginia in the business of contracting shall report under ITEM E the "gross income" of the business. (See definition of "gross income" below.)

ITEM F. Every person engaging or continuing within West Virginia in the business of banking shall report under ITEM F the "gross income" of the business. (See definition of "gross income" below.)

ITEM G. Every person engaging or continuing within West Virginia in the business of operating a theater, opera house, moving-picture show, vaudeville, amusement park, dance hall, skating rink, race track, radio broadcasting station, or any other place at which amusements are offered to the public, shall report under ITEM G the "gross income" of the business. (See definition of "gross income" below.)

ITEM H. Every person engaging or continuing within West Virginia in any service business or calling not otherwise specifically taxed shall report under ITEM H the "gross income" of the business. (See definition of "gross income" below.)

4. DEFINITION OF THE TERM "GROSS INCOME"

"Gross income" means the gross receipts of the taxpayer derived from trade, business, commerce or sales and the value proceeding or accruing from the sale of tangible property (real or personal) or service, or both, and all receipts by reason of the investment of the capital of the business engaged in, including interest, discount, rentals, royalties, fees or other emoluments however designated and without any deductions on account of the cost of property sold, the cost of materials used, labor costs, taxes, royalties, interest or discount paid or any other expense whatsoever.

IF THE SPACE ON THIS RETURN IS INSUFFICIENT TO ENTER ALL PROPER ITEMS OR NOTATIONS, SEPARATE SHEETS CONTAINING THE NECESSARY INFORMATION SHOULD BE ATTACHED; WHEN SO ATTACHED, THEY BECOME A PART OF THIS RETURN.

OATH

I, _____, do solemnly swear that the statements and items (both as to designations and amounts) entered in the foregoing return and in the supplementary statment and in any additional list or lists attached to or accompanying this return are, to the best of my knowledge and belief, true and correct in each and every particular; that the figures thereon reported were taken from the original books, papers and records of the taxpayer making return; and that the person signing the return is thoroughly familiar with the business reported in the return and with the original books, papers and records from which the return was prepared; and that IN REPORTING GROSS INCOME NO DEDUCTIONS WERE MADE ON ACCOUNT OF COST OF GOODS OR LABOR OR OTHER EXPENSES.

Sworn to and subscribed before me this ____ day of _____, 19____. _____ (Name of Taxpayer)

(Seal of Officer) _____ Notary Public.
(Taking Affidavit)

_____ (Official Title, if made on behalf of a corporation: President, Vice-President, Secretary or Treasurer, as the case may be.)

My commission expires on the _____ day of _____, 19____.

[fols. 50-148] PLAINTIFFS EXHIBIT NO. 4 TO BILL OF COMPLAINT

W516eng.-642

Standard Form No. 23—Approved by the President Nov. 19, 1926

Standard Government Form of Contract

(Construction)

D. C. Co., No. 1410—London Lock & Dam—U. S. E. D. Contract No. W516eng. 642, Kanawha River

War Department
(Department)

The Dravo Contracting Company
(Contractor)

Contract for Constructing the Second (Lock "B") of the Twin Locks, a Roller-Gate Dam and Appurtenant Works at—Place: the London Lock and Dam, Kanawha River, London, West Virginia

Amount, $1,571,925
(Estimated)

[fol. 149] Contract for Construction

This Contract, entered into this twenty-sixth day of November, 1932, by The United States of America, hereinafter called the Government, represented by the contracting officer executing this contract, and The Dravo Contracting Company, a corporation organized and existing under the laws of the State of Pennsylvania, a partnership consisting of —— ——, an individual trading as —— ——, of the city of Pittsburgh, in the State of Pennsylvania, hereinafter called the contractor, witnesseth that the parties hereto do mutually agree as follows:

Article 1. Statement of work.—The contractor shall furnish all labor and materials, and perform all work required for furnishing all labor and materials and performing all work for constructing the second (Lock "B") of the twin locks, a roller-gate dam, alterations to the upper miter-gate of the existing Lock "A", a power house on the river wall of Lock "A", and furnishing and installing the power house

machinery and lock illumination system, at the London Lock and Dam, Kanawha River, West Virginia, for the consideration of the sum based on designations and unit rates specified in schedule appended hereto in strict accordance with the specifications, schedules, and drawings, all of which are made a part hereof and designated as follows:

Specifications, Serial No. 33-59, issued by the U. S. Engineer Office, Huntington, W. Va., under date of September 15, 1932 (See modifications under article 9).

Addenda to Circular No. 33-59, dated October 6, 1932.

Letter of contractor dated October 14, 1932, in explanation of the two types of overflow gates bid on.

Drawings marked "Kanawha River, London Lock and Dam," file numbers as listed in Paragraph No. 3 of the specifications appended hereto.

Schedule of designations and unit rates.

The work shall be commenced within ten (10) calendar days after the date of receipt by the contractor of notice to proceed and shall be completed within 365 calendar days after the date of receipt by the contractor of the aforesaid notice to proceed.

An amount of time equal to that lost as a result of the flooding of cofferdams built to the required height caused by a rise in the Kanawha River (See Par. 11 of the specifications) will be allowed in addition to the 365 calendar days specified for the completion of the work, provided it is clearly established that this lost time is not due to any negligence on the part of the contractor.

[fol. 150] Article 2. Specifications and drawings.—The contractor shall keep on the work a copy of the drawings and specifications and shall at all times give the contracting officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In any case of discrepancy in the figures or drawings, the matter shall be immediately submitted to the contracting officer, without whose decision said discrepancy shall not be adjusted by the contractor, save only at his own risk and expense. The contracting officer shall furnish from time to time such detail drawings and other informa-

tion as he may consider necessary, unless otherwise provided. Upon completion of the contract the work shall be delivered complete and undamaged.

Article 3. Changes.—The contracting officer may at any time, by a written order, and without notice to the sureties, make changes in the drawings and (or) specifications of this contract and within the general scope thereof. If such changes cause an increase or decrease in the amount due under this contract, or in the time required for its performance, an equitable adjustment shall be made and the contract shall be modified in writing accordingly. No change involving an estimated increase or decrease of more than Five Hundred Dollars shall be ordered unless approved in writing by the head of the department or his duly authorized representative. Any claim for adjustment under this article must be asserted within ten days from the date the change is ordered, unless the contracting officer shall for proper cause extend such time, and if the parties can not agree upon the adjustment the dispute shall be determined as provided in Article 15 hereof. But nothing provided in this article shall excuse the contractor from proceeding with the prosecution of the work so changed.

Article 4. Changed conditions.—Should the contractor encounter, or the Government discover, during the progress of the work, subsurface and (or) latent conditions at the site materially differing from those shown on the drawings or indicated in the specifications, the attention of the contracting officer shall be called immediately to such conditions before they are disturbed. The contracting officer shall thereupon promptly investigate the conditions, and if he finds that they materially differ from those shown on the drawings or indicated in the specifications, he shall at once, with the written approval of the head of the department or his representative, make such changes in the drawings and (or) specifications as he may find necessary, and any increase or decrease of cost and (or) difference in time resulting from such changes shall be adjusted as provided in Article 3 of this contract.

Article 5. Extras.—Except as otherwise herein provided, no charge for any extra work or material will be allowed unless the same has been ordered in writing by the contracting officer and the price stated in such order.

Article 6. Inspection.—(a) All material and workmanship (if not otherwise designated by the specifications) shall be subject to inspection, examination, and test by Government inspectors at any and all times during manufacture and (or) construction and at any and all places where such manufacture and (or) construction are carried on. The Government shall have the right to reject defective material and workmanship or require its correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be satisfactorily replaced with proper material without charge therefor, and the contractor shall promptly segregate and remove the same from the premises.

(b) The contractor shall furnish promptly without additional charge, all reasonable facilities, labor, and materials necessary for the safe and convenient inspection and test that may be required by the inspectors. All inspection and tests by the Government shall be performed in such manner as not to unnecessarily delay the work. Special, full size, and performance tests shall be as described in the specifications. The contractor shall be charged with any additional cost of inspection when material and workmanship is not ready at the time inspection is requested by the contractor.

(c) Should it be considered necessary or advisable by the Government at any time before final acceptance of the entire work to make an examination of work already com- [fol. 151] pleted, by removing or tearing out same, the contractor shall on request promptly furnish all necessary facilities, labor, and material. If such work is found to be defective in any material respect, due to fault of the contractor or his subcontractors, he shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the contract, the actual cost of labor and material necessarily involved in the examination and replacement, plus 15 per cent, shall be allowed the contractor and he shall, in addition, if completion of the work has been delayed thereby, be granted a suitable extension of time on account of the additional work involved.

(d) Inspection of material and finished articles to be incorporated in the work at the site shall be made at the place of production, manufacture, or shipment, whenever the

quantity justifies it, unless otherwise stated in the specifications; and such inspection and acceptance, unless otherwise stated in the specifications, shall be final, except as regards latent defects, departures from specific requirements of the contract and the specifications and drawings made a part thereof, damage or loss in transit, fraud, or such gross mistakes as amount to fraud. Subject to the requirements contained in the preceding sentence, the inspection of material and workmanship for final acceptance as a whole or in part shall be made at the site.

Article 7.—Materials and workmanship.—Unless otherwise specifically provided for in the specifications, all workmanship, equipment, materials, and articles incorporated in the work covered by this contract are to be of the best grade of their respective kinds for the purpose. Where equipment, materials, or articles are referred to in the specifications as "equal to" any particular standard, the contractor shall furnish to the contracting officer for his approval the name of the manufacturer of machinery, mechanical and other equipment which he contemplates installing, together with their performance capacities and other pertinent information. When required by the specifications, or when called for by the contracting officer, the contractor shall furnish the contracting officer for approval full information concerning the materials or articles which he contemplates incorporating in the work. Samples of materials shall be submitted for approval when so directed. Machinery, equipment, materials, and articles installed or used without such approval shall be at the risk of subsequent rejection. The contracting officer may require the contractor to dismiss from the work such employee as the contracting officer deems incompetent, careless, insubordinate, or otherwise objectionable.

Article 8. Superintendence by contractor.—The contractor shall give his personal superintendence to the work or have a competent foreman or superintendent, satisfactory to the contracting officer, on the work at all times during progress, with authority to act for him.

Article 9. Delays—Damages.—If the contractor refuses or fails to prosecute the work, or any separable part thereof, with such diligence as will insure its completion

within the time specified in Article 1, or any extension thereof, or fails to complete said work within such time, the Government may, by written notice to the contractor, terminate his right to proceed with the work or such part of the work as to which there has been delay. In such event, the Government may take over the work and prosecute the same to completion by contract or otherwise, and the contractor and his sureties shall be liable to the Government for any excess cost occasioned the Government thereby. If the contractor's right to proceed is so terminated, the Government may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and necessary therefor. If the Government does not terminate the right of the contractor to proceed, the contractor shall continue the work, in which event the actual damages for the delay will be impossible to determine and in lieu thereof the contractor shall pay to the Government as fixed, agreed, and liquidated damages for each calendar day of delay until the work is completed or accepted the amount as set forth in the specifications or accompanying papers and the contractor and his sureties shall be liable for the amount thereof: Provided, That the right of the contractor to proceed shall not be terminated or the contractor charged with liquidated damages because of any delays in the completion of the work due to unforeseeable causes beyond the control and without the fault or negligence of the contractor, including, but not restricted to, acts of God, or of the public enemy, acts of the Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather or delays of subcontractors due to such causes: Provided further, That the contractor shall within ten days from the beginning of any such delay notify the contracting officer in writing of the causes of delay, who shall ascertain the [fol. 152] facts and the extent of the delay, and his findings of facts thereon shall be final and conclusive on the parties hereto, subject only to appeal, within thirty days, by the contractor to the head of the department concerned, whose decision on such appeal as to the facts of delay shall be final and conclusive on the parties hereto.

Article 10. Permits and care of work.—The contractor shall, without additional expense to the Government, obtain all required licenses and permits and be responsible for all

damages to persons or property that occur as a result of his fault or negligence in connection with the prosecution of the work, and shall be responsible for the proper care and protection of all materials delivered and work performed until completion and final acceptance.

Article 11. Eight-hour law—Convict labor.—(a) No laborer or mechanic doing any part of the work contemplated by this contract, in the employ of the contractor or any subcontractor contracting for any part of said work contemplated, shall be required or permitted to work more than eight hours in any one calendar day upon such work at the site thereof. For each violation of the requirements of this article a penalty of five dollars shall be imposed upon the contractor for each laborer or mechanic for every calendar day in which such employee is required or permitted to labor more than eight hours upon said work, and all penalties thus imposed shall be withheld for the use and benefit of the Government: Provided, That this stipulation shall be subject in all respects to the exceptions and provisions of the act of June 19, 1912 (37 Stat. 137), relating to hours of labor.

(b) The contractor shall not employ any person undergoing sentence of imprisonment at hard labor.

Article 12. Covenant against contingent fees.—The contractor warrants that he has not employed any person to solicit or secure this contract upon any agreement for a commission, percentage, brokerage, or contingent fee. Breach of this warranty shall give the Government the right to terminate the contract, or, in its discretion, to deduct from the contract price or consideration the amount of such commission, percentage, brokerage, or contingent fees. This warranty shall not apply to commissions payable by contractors upon contracts or sales secured or made through bona fide established commercial or selling agencies maintained by the contractor for the purpose of securing business.

Article 13.—Other contracts.—The Government may award other contracts for additional work, and the contractor shall fully cooperate with such other contractors and carefully fit his own work to that provided under other contracts as may be directed by the contracting officer. The contractor shall not commit or permit any act which will

interfere with the performance of work by any other contractor.

Article 14. Officials not to benefit.—No Member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

Article 15. Disputes.—Except as otherwise specifically provided in this contract, all disputes concerning questions of fact arising under this contract shall be decided by the contracting officer or his duly authorized representative, subject to written appeal by the contractor within thirty days to the head of the department concerned, whose decision shall be final and conclusive upon the parties thereto as to such questions of fact. In the meantime the contractor shall diligently proceed with the work as directed.

Article 16. Payments to contractors.—(a) Unless otherwise provided in the specifications, partial payments will be made as the work progresses at the end of each calendar month, or as soon thereafter as practicable, on estimates made and approved by the contracting officer. In preparing estimates the material delivered on the site and preparatory work done may be taken into consideration.

(b) In making such partial payments there shall be retained 10 per cent on the estimated amount until final completion and acceptance of all work covered by the contract: [fol. 153] Provided, however, That the contracting officer, at any time after 50 per cent of the work has been completed, if he finds that satisfactory progress is being made, may make any of the remaining partial payments in full: And provided further, That on completion and acceptance of each separate building, vessel, public work, or other division of the contract, on which the price is stated separately in the contract, payment may be made in full, including retained percentages thereon, less authorized deductions.

(c) All material and work covered by partial payments made shall thereupon become the sole property of the Government, but this provision shall not be construed as relieving the contractor from the sole responsibility for the care

and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the Government to require the fulfillment of all of the terms of the contract.

(d) Upon completion and acceptance of all work required hereunder, the amount due the contractor under this contract will be paid upon the presentation of a properly executed and duly certified voucher therefor, after the contractor shall have furnished the Government with a release, if required, of all claims against the Government arising under and by virtue of this contract, other than such claims, if any, as may be specifically excepted by the contractor from the operation of the release in stated amounts to be set forth therein.

Article 17. Additional security.—Should any surety upon the bond for the performance of this contract become unacceptable to the Government, the contractor must promptly furnish such additional security as may be required from time to time to protect the interests of the Government and of persons supplying labor or materials in the prosecution of the work contemplated by the contract.

Article 18. Definitions.—(a) The term "head of department" as used herein shall mean the head of the executive department or independent establishment involved, and "his representative" means any person authorized to act for him other than the contracting officer.

(b) The term "contracting officer" as used herein shall include his duly appointed successor or his duly authorized representative.

Article 19. Alterations.—The following changes were made in this contract before it was signed by the parties hereto:

This contract is subject to the distinct understanding that acceptance of the contractor's alternative proposal by the United States does not constitute approval of the specific methods of operating the flap-type gate as outlined in the contractor's letter dated October 14, 1932, accompanying his bid.

This contract is also subject to the following provisions of the Emergency Relief and Construction Act of 1932, approved July 21, 1932.

"Section 307. All contracts let for construction projects pursuant to this title shall be subject to the conditions that no convict labor be directly employed on any such project, and that (except in executive, administrative, and supervisory position), so far as practicable, no individual directly employed on any such project shall be permitted more than thirty hours in any one week, and that in the employment of labor in connection with any such project, preference shall be given, where they are qualified, to ex-service men with dependents."

On account of a reduction in the width of the land to be acquired by the United States on the bank of the river at the abutment end of the London dam having been necessary subsequent to the date of the opening of bids, the following changes and revisions are hereby made in the plans and specifications:

Plans

Eight tracings have been revised and three tracings superseded as indicated below:

Revised—90/2, 40/0—14—15—23, 53/12—18, 56/6.

Superseded—10/4, 40/22, 53/14 have been superseded by 10/4.1, 40/22.1 and 53/14.1.

Specifications

Invitation for bids, page (e). Drawing 10/4 changed to 10/4.1.

Page 3, paragraph 2 (1). Approximate length of cut-off wall changed from 150 to 100 feet.

Page 3, paragraph 3. Drawings No. 10/4, 40/22, and 53/14, changed, respectively, to 10/4.1, 40/22.1, and 53/14.1.

Page 4, paragraph 4:

Amount	in	item	No.	2	changed	from	584	to	580.5
"	"	"	"	58	"	"	11,600	to	11,250.0
"	"	"	"	59	"	"	5,200	to	5,050.0
"	"	"	"	61	"	"	22,200	to	21,300.0
"	"	"	"	63	"	"	240	to	215.0
"	"	"	"	65	"	"	83,500	to	80,300.0
"	"	"	"	66	"	"	6,600	to	6,100.0
"	"	"	"	69	"	"	157	to	135.0

Page 12, paragraph 20. Drawing 10/4 changed to 10/4.1.

Page 17, paragraph 102 (c). Payment length of dam cofferdam changed from 584.0 to 580.5. The unit price of $100

per lineal foot of cofferdam shown in the schedule of prices shall be increased to $100.62 per lineal foot in order that there be no reduction in total price bid for the cofferdam required under this contract.

Page 22, paragraph 2-01 (1). Drawing 10/4 changed to 10/4.1.

Page 22, paragraph 2-01 (3). 150 linear feet changed to 100, and sheet 40/22 to 40/22.1.

Page 144, paragraph 21-05. Drawing 10/4 changed to 10/4.1.

Page 145, paragraph 22-02 (a). Drawing 40/22 changed to 40/22.1.

Page 145, paragraph 22-02 (b). Dimension 125 feet long changed to 102 feet.

Bid Form

Page	A,	Item	2	Change	584.0	to	580.5
"	D,	"	58	"	11,600	to	11,250
"	"	"	59	"	5,200	to	5,050
"	"	"	61	"	22,200	to	21,300
"	"	"	63	"	240	to	215
"	"	"	65	"	83,500	to	80,300
"	"	"	66	"	6,600	to	6,100
"	E	"	69	"	157	to	135

Article 20. Approval. This contract shall be subject to the written approval of the Chief of Engineers, U. S. Army, and shall not be binding until so approved.

In Witness Whereof, the parties hereto have executed this contract as of the day and year first-above written.

Dec. 20, 1932.

Lytle Brown.

The United States of America by Fred W. Herman, (Official title:) Major, Corps of Engineers. The Dravo Contracting Company, by J. S. Miller, Vice President, Contractor, (Business address:) Neville Island Station, Pittsburgh, Pa.

Two witness: H. L. Hood. F. J. Stritzinger.

[fol. 154] I, Wm. H. Fowler, certify that I am the secretary of the corporation named as contractor herein; that J. S. Miller who signed this contract on behalf of the contractor, was then Vice-President of said corporation; that said contract was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

Wm. H. Fowler, Secretary. (Corporate Seal.)

I hereby certify that, to the best of my knowledge and belief, based upon observation and inquiry, ——, who signed this contract for the ——, had authority to execute the same, and is the individual who signs similar contracts on behalf of this corporation with the public generally.

Fred W. Herman, Contracting Officer.

This contract is authorized by the act of Emergency Relief and Construction Act, July 21, 1932.

Directions for Preparation of Contract

1. This form shall be used for every formal contract for the construction or repair of public buildings or works, but its use will not be required in foreign countries.

2. There shall be no deviation from this standard contract form, except as provided for in these directions, without prior approval of the Director of the Bureau of the Budget obtained through the Interdepartmental Board of Contracts and Adjustments. Where interlineations, deletions, additions, or other alterations are permitted, specific notation of the same shall be entered in the blank space following the article entitled "Alterations" before signing. This article is not to be construed as general authority to deviate from the standard form. Deletion of the descriptive matter not applicable in the preamble need not be noted in the article entitled "Alterations."

3. The blank space of Article 1 is intended for the insertion of a statement of the work to be done, together with place of performance, or for the enumeration of papers which contain the necessary data.

4. If it is deemed necessary to include an article on Patents the Invitation to Bidders shall so state and the following article be used:

Article —. Patents.—The contractor shall hold and save the Government, its officers, agents, servants, and employees, harmless from liability of any nature or kind for or on account of the use of any patented or unpatented invention, article, or appliance furnished or used in the performance of this contract, excepting patented articles required by the Government in its specifications, the use of which the contractor does not control.

5. Where only one payment is contemplated, upon completion of the contract, all except paragraph (d) of Article 16, "Payments to Contractor," must be stricken out.

6. If approval of the contract is required before it shall become binding, the following article must be added:

Article —. Approval.—This contract shall be subject to the written approval of —— ——, and shall not be binding until so approved.

Contracts subject to approval are not valid until approved by the authority designated to approve them, and the contractor's copy will not be delivered, nor any distribution made, until such approval. All changes and deletions must have been made before the contract is forwarded for approval.

7. The number of executed copies and of certified copies, designation of disbursing officer, statement of appropriation, amount of bond, designation of place of inspection, as well as other administrative details, shall be as directed by the department to which the contract pertains.

[fol. 155] 8. All blank spaces must be filled in or ruled out. The contract must be dated, and the bond must bear the same or subsequent date.

9. An officer of a corporation, a member of a partnership, or an agent signing for the principal, shall place his signature and title after the word "By" under the name of the principal. A contract executed by an attorney or agent on behalf of the contractor shall be accompanied by two authenticated copies of his power of attorney, or other evidence of his authority to act on behalf of the contractor.

10. If the contractor is a corporation, one of the certificates following the signatures of the parties must be executed. If the contract is signed by the secretary of the corporation, then the first certificate must be executed by some other officer of the corporation under the corporate seal, or the second certificate executed by the contracting officer. In lieu of either of the foregoing certificates there may be attached to the contract copies of so much of the records of the corporation as will show the official character and authority of the officer signing, duly certified by the secretary or assistant secretary, under the corporate seal, to be true copies.

11. The full name and business address of the contractor must be inserted, and the contract signed with his usual signature. Typewrite or print name under all signatures to contract and bond.

12. The contracting officer must fill in the citation of the act authorizing the contract as indicated at the end of the last page of the contract.

13. The Invitation, Bid, Acceptance, and Instructions to Bidders are not to be incorporated in the contract.

14. The specifications should include a paragraph stating the amount of liquidated damages that will be paid by the contractor for each calendar day of delay, as indicated in Article 9 of the contract.

[fol. 156] Copy

The Dravo Contracting Company

Pittsburgh, Pa.

October 14, 1932.

Description of Roller Gates—Overflow Type—Contemplated in Paragraph 13-08 page 111 Specification Serial 33-59 and Addendum Thereto Dated October 6, 1932

Major Fred W. Herman, District Engineer, United States Engineer Office, Huntington, W. Va.

DEAR SIR:

In connection with proposals to be opened 10:00 A. M. October 15, 1932, for the construction of roller gate dam in the Great Kanawha River under specification serial 33-59 dated September 15, 1932, we wish to place on record a description of the roller gate equipment which has been quoted to the various general contractors in accordance with the specification requirements.

The standard roller will conform in every respect to all the requirements of the Government specifications and blueprints which describe very accurately the kind and type of equipment required.

For the overflow type of gate as described in the Addendum dated October 6, 1932, covering Paragraph 13-08 of the specifications we wish to advise that our proposals cover

the furnishing of alternate constructions each of which comply with the requirements of the specifications as set forth in the Addendum.

(1) Submerging Type Roller Gate

The basic bid covers the construction of a submergible roller gate with sill seal by means of a pipe. The construction of this roller and the end seal is the same as for the standard or normal rollers. The regulation of the upper pool is effected by submerging the roller. In order to hold the upper pool with the dam in the damming position a sill seal is required. This seal consists of a pipe tube which is pushed in between the sill and the lower edge of the apron of the gate. This arrangement provides that after the tube is in position the entire weight of the gate rests upon the tube thereby effecting a positive seal and at the same time completely taking the load off the chain and drive.

[fol. 157] When submerging the gate it is first raised slightly providing for the reseating of the pipe tube sill back into its guiding box which makes it possible to lower the roller gate without the tube sliding on the sill reinforcing. The sill seal consisting of a tube as described above is not subject to damage even under improper handling, since it either will set on the sill or slide past it.

(2) Roller Gate With Flap

As an alternate proposal we now offer a roller with flap. In the case of this design the sill and the end seal is exactly the same as for the normal roller. The arrangement of flap is shown on Krupp drawing 2216 which we hand you herewith. The gate is moved in the usual way by a triple link chain which when pulled up is stored in a chain rack. This chain will be permanently attached to the gate as is the case with the standard roller.

The operation of the flap is by means of a torsion tube in the center of the roller. Several levers are attached to the torsion tube which are connected with the flap by connection rods. This arrangement permits the flap to be supported and raised at several points instead of only from one end which prevents distortion of the flap. With the flap in its top position the center of the torsion tube, the connecting lever pin, the connecting rod and the attachment of the flap are located on a straight line so that there is no torsional stress in the torsion tube with the flap in its raised

position and therefore no stress in the operating mechanism. It is possible to set the elevation of the flap to allow any amount of overflow up to five feet.

With the roller resting on the sill seal the operation of the flap is by a motor which is common for driving both the gate, as well as the flap. With the motor rotating in one or the opposite direction the flap may be raised or lowered. In this case the sprocket which is located under the sprocket wheel shaft of the gate drive, idles. When raising the gate the motor is disengaged from the flap drive and coupled to the gate drive. For raising and lowering of the gate, however, the flap operating chain which lies alongside the gate operating chain must be wound or unwound with the same speed. To insure the simultaneous movement of the flap chain the sprocket for the flap chain which is located under the sprocket shaft of the gate chain is coupled with the gate drive.

In raising the gate the flap chain is stored on a chain slide so that it does not foul the drum for the flap operation with the gate in its highest position. The clutches for changing the motor over from gate drive to flap drive and vice versa are positively interconnected so that only one clutch is engaged at one time. Limit switches are provided for the travel of both the flap as well as the gate.

[fol. 158] It is appreciated that the specification requirements do not require a submission of design information in connection with the roller gates specified and the above is submitted in order that our proposal may be entirely clear.

Yours very truly, The Dravo Contracting Company, Engineering Works Department, by V. B. Edwards, Vice-President and General Manager.

VBE/ich.

[fol. 159] No. —. Bidder: —— ——. Serial No. 33-59

(Do not write above this line)

Standard Government Form of Invitation for Bids

(Construction Contract)

War Department, U. S. Engineer Office

Huntington, W. Va., September 15, 1932.

Sealed Bids, in duplicate, subject to the conditions contained herein, will be received until 10:00 A.M. (Eastern

Time), October 15, 1932, and then publicly opened, for furnishing all labor and materials and performing all work for constructing the second (Lock "B") of the twin locks, a roller-gate dam, alterations to the upper miter-gate of the existing Lock "A", a power house on the river wall of Lock "A", and furnishing and installing the power house machinery and lock illumination system, at the London Lock and Dam, Kanawha River, West Virginia.

This work is to be undertaken under an appropriation for the purpose of accelerating such governmental construction projects as will increase public employment during the present emergency.

Employees.—The provisions of Section 307 of the Emergency Relief and Construction Act of 1932, will be incorporated in the contract. (See Par. 7 of the specifications.)

The plans which will become a part of this contract are designated in paragraph 3 of the specifications.

Where copies of plans are requested, a deposit of $35.00 will be required to insure their return. The deposit should be in the form of a United States money order or a certified check made payable to "The Disbursing Officer, U. S. Engineer Office, Huntington, W. Va."

Guaranty will be required with each bid as follows: Bid bond, standard Form No. 24, will be executed in a penal sum approximately equal to or not less than 10 per cent of the total amount of the bid. Individual sureties will justify in sums aggregating not less than double the penalty of the bid bond. (See Pars. 8-11, inclusive, of Instructions to Bidders).

[fol. 160] Performance bond will be required as follows: Standard Form No. 25 will be executed in a penal sum approximately equal to and not less than 50 per cent of the full amount of the consideration of the contract. Individual sureties will justify in sums aggregating not less than double the penalty of the performance bond.

Liquidated damages for delay will be prescribed. (See Par. 6 of the specifications.)

Partial payments will be made. (See Par. 10 of the specifications and article 16 of the contract.)

Articles on patents will be made a part of the contract. (See Par. 27 of the specifications.)

Bids must be submitted upon the standard Government form of bid and the successful bidder will be required to

execute the standard Government form of contract for construction.

Experience.—(a) After the bids are opened, any bidder may be required by the contracting officer to state whether he is now or ever has been engaged on any contract or other work similar to that proposed, the year in which it was done, and the manner of its execution, and to give such other information as will tend to show his ability to prosecute vigorously the work required by these specifications.

(b) For the design of the roller gates required under Section XIII, the successful bidder will be required to employ an organization thoroughly experienced in the design of high grade hydraulic gates of large dimensions and their machinery, for use in power or navigation dams.

(c) For the installation of the roller gates, the successful bidder will be required to employ an organization thoroughly experienced and skilled in the fabrication and erection of steel structures requiring a similar high degree of precision and workmanship. After the opening of bids, any bidder may be required by the contracting officer to submit satisfactory evidence that the specific organization which he proposes to employ on this portion of the contract has successfully executed work of the nature and quality indicated above.

Information to be Submitted with Bid.—(1) The drawings, charts, statement of plant, and other information re- [fol. 161] quired below, shall be carefully prepared and presented in neat and legible form. These data are considered essential in assisting the contracting officer to determine whether or not the bidder is responsible, experienced in similar types of construction, and that his bid is based on a careful study of construction methods applicable to the work and full realization of the various factors which may affect its progress.

(2) A drawing or drawings showing the plant layout the bidder proposes to utilize on the work. The drawing shall clearly indicate the location and manner of employment of the various major items of plant, such as the location of material yards, disposition for the handling of materials, location of tracks, the manner in which excavation will be removed and fill placed, the location of mixing plants,

and the manner in which concrete will be placed and metal work erected. The layout shall be indicated distinctly for work in each cofferdam. This plant layout shall be accompanied by a complete list and description, inserted in the space provided therefor in the bid form, of all plant that the bidder now has or will have available for this work, and its location at the time of opening of bids, in order that it may be inspected by the contracting officer should he so desire. The above information will be considered confidential.

(3) There shall also be submitted a chart indicating the volume of work to be done and the rate of progress which the bidder agrees to maintain for each of the following major operations required in the performance of the work under these specifications:

1. Cofferdams.
2. Excavation (including foundations).
3. Concreting.
4. Construction of power house on river wall of Lock "A"
5. Installation of power house equipment and lock illuminating system.
6. Installation of roller gates (including operating machinery).
7. Installation of miter gates and lock valves.
8. Erection of service bridge.
9. Alterations to upper miter gate of Lock "A".

Pertinent items shall be indicated separately for the lock and the dam. The chart shall be in the form of plotted curves for which the abscissas shall represent definite intervals of *time* measured from the date of notice to proceed [fol. 162] with the work, and the ordinates shall represent percentages of completion based on the estimated contract quantities. In preparing the charts due allowance shall be made for probable delays caused by high water and inclement weather.

(4) Bidders shall state, in the spaces provided therefor, the names and addresses of the organizations by whom the roller-gate plans will be prepared, and the gates fabricated and erected. They shall also submit with their bids, conclusive evidence of compliance by the roller-gate design organization with the requirements of subparagraph (b)

under "Experience," above. Failure to submit this evidence will be sufficient cause for rejection of a bid.

(5) Each bidder shall also submit with his bid the data sheets attached to the bid form properly filled in, together with descriptive information, dimensioned drawings or cuts, and catalogue data, in duplicate, so as clearly to indicate the size, weight, capacity, rating, type and material of each item in question. The name of one manufacturer only shall be entered against any item. The term "or equal" shall not be used by the bidder in describing equipment to be furnished.

Investigation of Conditions.—Samples of core borings taken at the lock site are on hand at Lock No. 3, Glasgow, W. Va., Kanawha River, where they should be inspected by prospective bidders. It is expected that bidders will visit the site and acquaint themselves with all available information concerning the nature of the materials that will be encountered in the river bed, the depths to which it may be necessary to excavate in order to secure satisfactory foundations, the possibility that the river bed or banks will change from natural causes prior to or after commencement of the work, and the local conditions having a bearing on transportation facilities and handling and storage of materials. Failure to acquaint himself with all available information concerning these conditions will not relieve the successful bidder of assuming all responsibility for improperly estimating the difficulties entering into and costs of performing the complete work as required.

Bid and Contract.—The bid form has an entry for each item on which estimates will be given or payments made, and no other allowances of any kind will be made unless specifically provided for in the specifications or the contract, or adjustments under Article 3 of the contract.

All bids must be for the entire work and must have each blank filled.

[fol. 163] The quantities of each item of the bid, as finally ascertained at the close of the contract, in the units given and the unit prices of the several items stated by the bidder in the accepted bid, will determine the total payments to accrue under the contract. The unit price bid for each item must allow for all collateral or indirect cost connected with it.

Award of Contract.—Subject to the rights hereinafter reserved, the work will be awarded as a whole to one bidder.

A bid may be rejected if a bidder fails to submit the information and furnish the guaranty required with his bid, or cannot promptly show to the satisfaction of the contracting officer that he has the necessary capital and experience, and owns or controls the necessary plant to perform the work, and that he is not already obligated for the performance of as much work as he will probably be able to complete during the period contemplated by this advertisement.

Any unbalanced bid, which, in the opinion of the contracting officer, jeopardizes the interests of the United States will be subject to rejection for that reason.

The land on the abutment end of the dam (shown on drawing 10/4) is not yet in the possession of the United States. It is anticipated that the right of entry to this land will be obtained about November 1, 1932. The right is reserved to withhold award until this right of entry has been obtained.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Envelopes containing bids must be sealed, marked and addressed as follows:

Bid for London Lock and Dam, Kanawha River, To be opened October 15, 1932	The District Engineer, U. S. Engineer Office, P. O. Box No. 1780, Huntington, W. Va.

NOTE.—See Standard Government Instructions to Bidders and copy of the Standard Government Form of Contract, Bid Bond and Performance Bond, which may be obtained upon application.

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[fol. 172] War Department

Specifications for Constructing the Second (Lock B) of Twin Locks and a Roller-Gate Dam

London Lock and Dam, Kanawha River

General Specifications

1. Location.—The site of the work contemplated herein is in the Kanawha River near the town of London, W. Va., about 24 miles above the City of Charleston, W. Va., and 83 miles above the mouth of the river.

2. Work to be done. (a) The work provided for herein is authorized by the River and Harbor Act approved July 3, 1930.

(b) The work to be performed under this contract will consist of furnishing all plant, labor, material and equipment for, except part of the power house equipment described later, and constructing or installing the following, complete and ready for operation, in accordance with these specifications and the drawings referred to in paragraph 3:

(1) Lock "B", the second and landward lock of twin, 56-foot by 360-foot locks, complete with 2 miter gates, 4 gate-operating machines, 2 Stoney gate valves, all necessary piping for hydraulic operation, and gas, gasoline, and water supply lines.

(2) Power House of reinforced concrete, on the river wall of Lock "A". (See Sec. XI.)

(3) Power House Machinery, including stand-by gasoline-electric power unit, pumping equipment for hydraulic operating machinery, and air compressor and signal. (See Sec. XII.)

(4) Electrical Power Distribution System complete for both locks "A" and "B" and the dam, including illumination system complete and signal-light feeders. (See Sec. XIX.)

[fol. 173] (5) Roller-Gate Dam consisting of five 100-foot by 26-foot steel gates closing on concrete sills between concrete piers and individually operated by electric hoists housed on the tops of the piers (see Sec. XIII); a steel bridge of the deck-truss type approximately 565 feet in

length and provided with a 30-ton revolving crane operating on the top chords and a 30-ton bridge crane unit on the bottom chords (see Secs. XVII and XVIII); and an emergency bulkhead composed of 7 steel-truss units for closing a gate opening, (see Sec. XVI).

(6) Alterations to Upper Gate of Lock "A", including the removal of a detachable section on the bottom of the gate, the raising of the concrete sill, and the construction of the foundation for emergency bulkhead. (See Sec. XX).

(7) Miscellaneous Work, as specified or indicated on the drawings, including a reinforced concrete storm sewer adjacent and parallel to the land wall of Lock "B", the removal and disposal of an old existing rock-filled timber-crib ice breaker below the dam and the existing cofferdam at the upstream end of Lock "B", shown on sheet 90/1B; the excavation and grading of the river bed adjacent to Pier No. 6; filling and grading back of the land wall of Lock "B"; and such incidental work as needed or ordered in writing by the contracting officer. (See Sec. XXI).

2. (c) Contingent Work.—The work listed below may or may not be done, contingent on the possible construction by private interests of a hydroelectric power plant adjacent to and landward of Pier No. 6. Unit bid prices on the items comprising this contingent work will be stated separately in the bid form. The contracting officer will notify the contractor not later than May 1, 1933, whether or not this work will be required to be done, and such notice shall be binding upon the contractor. No additional time for completion beyond that stated in paragraph 6 will be allowed in the event the contingent work is required to be done under this contract. Bids will be canvassed on the basis of performing the entire work, including the contingent items.

[fol. 174] (1) Temporary Abutment, consisting of 3 circular steel-piling cells above and connected to Pier No. 6, with approximately 150 linear feet of steel-piling cut-off wall extending into the bank, and a concrete and timber-crib toe wall immediately downstream of Pier No. 6. (See Sec. XXII).

(2) Storage Facilities for the Emergency Bulkhead, consisting of concrete paving, a short section of bridge-crane runway supported by steel columns and bents, 2 short sec-

tions of steel track, and 2 steel, 4-wheel trucks. (See Sec. XXII).

3. Drawings and Blueprints.—(a) The work shall conform to drawings marked: "Kanawha River, London Lock and Dam," file numbers as listed below, which form a part of these specifications, and which are filed in the United States Engineer Office at Huntington, W. Va.

174 sheets with file numbers as follows:

General	Lock	Dam
023LL 0/1	.....	023LL 40/0-40/23, incl.
023LL 10/1	023LL 20/1B, 3B, 5B, 20/6.1, 6B, 7B, 10B-24B, incl.	
023LL 10/4	023LL 21/1B-9B, incl.	023LL 41/1-4, incl.
023LL 10/5	023LL 22/1B-9B, incl.	023LL 47/1, 2, 3.
023LL 14/1	023LL 24/1B-23B, incl.	023LL 53/1-18, incl.
023LL 90/1B	023LL 27/1B	023LL 56/1-6, incl.
023LL 90/2	023LL 29/1-13, incl.	023LL 58/1-7, incl.
	023LL 30/1B	
	023LL 70/1-12, incl.	
	023LL 71/1-16, incl.	

(b) The work shall also conform to such other drawings relating thereto as may be exhibited in the office of the contracting officer prior to the opening of proposals, and to such drawings in explanation of details or minor modifications as may be furnished from time to time during construction, including such changes of detail as the contracting officer may consider necessary on account of conditions that are found to exist during the prosecution of the work. The contractor shall check all drawings and shall be responsible for the correct fitting together and the exact position of all parts of the work. Parts and details not fully shown on the drawings shall be detailed by the con- [fol. 175] tractor in accordance with the best practice, and after approval by the contracting officer, three copies of each drawing shall be supplied him before the corresponding shop work is commenced. All of these drawings will form a part of these specifications.

3. (c) Blueprints.—Ten sets of blueprints of necessary drawings will be furnished the contractor without charge. Additional blueprints will be furnished on request at cost of printing.

4. Quantities.—The following estimate of quantities is given only to serve as a basis for comparison of bids. Within the limits of funds available, the United States reserves the right to increase or decrease the quantities as

herein estimated by such amounts as will complete the work specified in paragraph 2 and final payment will not be made until the work is so completed.

Item No.	Designation	Unit	Amount
1.	Cofferdam—Lock "B"	Lin. Ft. of work inclosed	1,134
2.	Cofferdam—Dam	do	584
3.	Cofferdam—Auxiliary (work in Lock "A")	Sum	(Sum)
4.	Excavation—Common	Cu. Yd.	151,000
5.	Excavation—Rock	Cu. Yd.	5,700
6.	Channeling—Rock	Sq. Ft.	24,300
7.	Drilled Holes—Grouting—1st 10 feet	Lin. Ft.	1,400
8.	Drilled Holes—Grouting—2d 10 feet	Lin. Ft.	500
9.	Grouting	Bbl.	400
10.	Fill	Cu. Yd.	35,000
11.	Piling—Round Timber	Lin. Ft.	8,500
12.	Piling—Steel Sheet	Sq. Ft.	15,600
13.	Timber—Oak	M. B. M.	42
14.	Timber—Yellow Pine—Creosoted	M. B. M.	25
15.	Concrete—Class "A"	Cu. Yd.	15,300
16.	Concrete—Class "B"	Cu. Yd.	58,000
17.	Steel—Structural	Pound	1,824,000
18.	Steel—Nickel	Pound	368,600
19.	Steel—Cold-rolled	Pound	3,400
20.	Steel—Reinforcing	Pound	492,000
21.	Forgings—Steel	Pound	29,400
[fol. 176]			
22.	Castings—Steel—Class "A"	Pound	281,000
23.	Castings—Steel—Class "B"	Pound	105,000
24.	Castings—Steel—"Nickel"	Pound	12,400
25.	Castings—Iron	Pound	11,800
26.	Bolts	Pound	24,300
27.	Bronze	Pound	1,400
28.	Babbitt Metal	Pound	3,800
29.	Pipe—Cast Iron	Pound	4,700
30.	Pipe—Steel—6-inch	Lin. Ft.	58
31.	Pipe—Vitrified Clay—12-inch	Lin. Ft.	600
32.	Pipe—For hydraulic operation system and water gas, gasoline and oil supply lines	Sum	Sum
33.	Conduit—Fibre—3-inch	Lin. Ft.	4,630
34.	Conduit—Fibre—4-inch	Lin. Ft.	176
35.	Conduit—Metal—1-inch	Lin. Ft.	160
36.	Conduit—Metal—1½-inch	Lin. Ft.	1,860
37.	Conduit—Metal—2-inch	Lin. Ft.	150
38.	Conduit—Metal—2½-inch	Lin. Ft.	3,950
39.	Conduit—Metal—3-inch	Lin. Ft.	1,500
40.	Handrailing—Pipe	Lin. Ft.	820
41.	Stoney Gate Valves—complete	Each	2
42.	Operating Machines—Lock Gate	Each	4
43.	Power House	Sum	Sum
44.	Machinery—Power House	Sum	Sum
45.	Tow-Haulage Units	Each	2
46.	Roller-Gates—Complete with Operating Machinery	Each	5
47.	Operating Houses (on Dam Piers)	Each	5
48.	Crane Track—50-lb. Rail	Trk. Ft.	565
49.	Crane Track—80-lb. Rail	Trk. Ft.	565
50.	Revolving Locomotive Crane—Electric	Sum	Sum
51.	Bridge-Crane Unit—Electric	Sum	Sum
52.	Electric Wiring, Illumination and Control Equipment	Sum	Sum
53.	Alterations at Upper Gate of Lock "A"	Sum	Sum
54.	Removal of old rock-filled timber-crib ice breaker	Sum	Sum

[fol. 177]

Contingent Items

Item No.	Designation	Unit	Amount
55.	Excavation—Common	Cu. Yd.	40,000
56.	Excavation—Rock	Cu. Yd.	6
57.	Channeling—Rock	Sq. Ft.	120
58.	Fill	Cu. Yd.	11,600
59.	Stone—Riprap and Derrick	Cu. Yd.	5,200
60.	Piling—Round Timber	Lin. Ft.	1,380
61.	Piling—Steel Sheet	Sq. Ft.	22,200
62.	Timber—Commor	M. B. M.	22
63.	Concrete—Class "A"	Cu. Yd.	240
64.	Concrete—Class "B"	Cu. Yd.	280
65.	Steel—Structural	Pound	83,500
66.	Steel—Reinforcing	Pound	6,600
67.	Bolts	Pound	2,200
68.	Pipe—Cast Iron	Pound	59,300
69.	Crane Track—50-lb. rail	Trk.Ft.	157
70.	4-wheel Trucks	Each	2
71.	Electrical Wiring	Sum	Sum

5. Present Conditions of the Work.—(a) Lock "A" (riverward lock) of the twin locks, including piping for hydraulic operation and lock-operating machinery, has been completed under a previous contract. In order to provide navigating depths at existing water stages, the upper sill of Lock "A" has been constructed at a low elevation and the mitering gate installed with a removable section attached to the bottom. An existing section of steel-piling cofferdam, extending from the intermediate wall into the bank, is in place at the upper end of the lock and may be utilized as the upper arm of the lock-cofferdam to be constructed under this contract.

6. Commencement, Prosecution and Completion.—The contractor will be required to commence work under the contract within 10 calendar days after the date of receipt by him of notice to proceed, to prosecute the said work with faithfulness and energy, and to complete the entire work within 365 calendar days after the receipt by him of the aforesaid notice to proceed. In case of failure on the part of the contractor to complete the entire work within the time thus determined and agreed upon for its completion, the contractor shall pay to the Government as liquidated damages the sum of $200.00 for each calendar day of delay until the work is placed in a safe and practical operating condition, as determined by the contracting officer, and thereafter the contractor shall pay to the Government as liquidated damages the sum of $25.00 for each calendar day of delay until the remaining work to be performed under [fol. 178] the contract is completed and/or accepted. An

amount of time equal to that lost as a result of the flooding of cofferdams built to the required height caused by a rise in the Kanawha River (see par. 11) will be allowed in addition to the 365 calendar days specified for the completion of the work provided it is clearly established that this lost time is not due to any negligence on the part of the contractor.

7. Employees.—(a) The contract entered into under these specifications is subject to the following provision of the Emergency Relief and Construction Act of 1932, approved July 21, 1932:

"Section 307. All contracts let for construction projects pursuant to this title shall be subject to the conditions that no convict labor shall be directly employed on any such project, and that (except in executive, administrative and supervisory positions), so far as practicable, no individual directly employed on any such project shall be permitted to work more than thirty hours in any one week, and that in the employment of labor in connection with any such project, preference shall be given, where they are qualified, to ex-service men with dependents."

Under the above quoted law no individual (except in executive, administrative or supervisory positions) will be permitted to work more than thirty hours in any one week except on the written decision of the contracting officer that such limitation on the hours of employment is not practicable. The records of the contractor showing the hours of employment of all persons employed by him on the work shall be open to inspection by the contracting officer and his representatives.

8. Sundays, Holidays and Nights.—No work shall be done on Sundays or on days declared by Congress as holidays for per diem employees of the United States except in cases of emergency, and then only with the written consent of the contracting officer; work may be carried on at night if authorized in writing by the contracting officer.

9. Physical Data.—(a) The stages of water and the frequency and duration of floods which may be expected are indicated on sheet 14/1.

(b) The site of the work is in the pool above the existing Dam No. 3, Kanawha River. The normal level of the pool

at this point is at elevation 591.57. For the alteration of the upper gate of Lock "A" and the construction of the [fol. 179] gate sill and the emergency-dam foundation, the upper pool will be maintained not lower than elevation 603.0 in order to permit navigation over the upper sill of Lock "B".

9. (c) Railroad connections to the vicinity of the work are afforded by the New York Central Railroad on the east bank and the Chesapeake and Ohio Railroad on the west bank. An improved highway is also located on each bank adjacent to the railroad. Water transportation is also available during the navigation season from all points on the Inland Waterways System.

10. Payments will be made monthly on estimates of such work as has been completed and accepted in accordance with the specifications and not included in any prior estimate, except that 10 per cent of the amount of each estimate will be retained until the contract work is 50 per cent completed, and thereafter with each monthly payment there will be paid such portion of the amount so retained as is in excess of 10 per cent of the estimated cost of completing the work remaining to be done, until the amount retained is reduced to $50,000, after which the amount to be retained will remain unchanged until the completion of the contract. [Should payment be discontinued owing to exhaustion of available funds, all but $25,000 of the total amount retained will be paid to the contractor.]*

11. Flooding of Cofferdams.—(a) In the event that work remains to be done and is actually in progress within either the lock or dam cofferdams constructed to the height specified in Section I, and a rise in the Kanawha River overtops cofferdams where built and maintained to the full height specified in paragraph 1-02 (b), an allowance of $2,500 for each cofferdam will be made to the contractor upon full resumption of work within the cofferdams, subject to the following: Only one allowance will be made for a rise; allowances for overtopping of the cofferdams will be made only during the period allowed for completion of the work under paragraph 6 of these specifications, and it will not be made during any additional time that may be allowed under Articles 3, 5 and 9 of the contract. No payment will

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be made for flooding of the auxiliary cofferdam for the construction in Lock "A".

(b) No allowance will be made in case a cofferdam is flooded through failure of the cofferdam. In case the contractor floods a cofferdam during a rise prior to natural flooding due to overtopping the cofferdam, the flooding will [fol. 180] be considered grounds for the allowance provided the rise actually overtops the cofferdam where built to the full height specified.

12. Extra Work.—(a) For any extra work ordered in writing by the contracting officer which is not otherwise included in the contract and for which no basis of measurement or payment is provided for elsewhere in these specifications, the contractor shall furnish materials, labor, and plant on the basis of actual cost to the contractor plus a commission of 10 per cent to cover supervision and use of tools, the rates for labor not to exceed those prevailing in the immediate vicinity for labor of equal skill.

(b) The actual cost of extra work above specified shall include the cost to the contractor of necessary labor and materials employed on or incorporated into the work, together with the cost of insurance of employees, and the public where such insurance is carried, and such allowance for the use of any plant or machinery actively employed on this extra work as may be determined by the contracting officer, but such actual cost shall not include the use of tools, general superintendence, office accounting, engineering expenses, allowances or percentages for collateral or estimated costs, or any profit, all of which shall be deemed to be and shall be included in and covered by the above specified allowance of 10 per cent.

(c) The unit prices to be charged for such labor, materials, plant and machinery as will be required in the execution of this additional work, shall be submitted by the contractor and approved in writing by the contracting officer before such additional work is commenced. The contracting officer may at his discretion furnish any materials or supplies required for the extra work, and the contractor shall not be entitled to any allowance or percentage on account of materials and supplies so furnished.

(d) At the close of each day on which extra work performed on the actual cost basis shall have been done by the

contractor, reports shall be made out in triplicate on forms to be furnished for that purpose by the contracting officer, showing in detail the cost and character of extra work performed on that day; these reports shall be approved by the contracting officer and by the contractor or his proper agent, and one copy shall be retained by the contractor.

13. Work Covered by Price Bid.—The contractor shall under his contract prices furnish and pay for all material and labor, and all permanent, temporary and incidental [fol. 181] work, furnish all accessories, and do everything which may be necessary to carry out the contract in good faith, which contemplates everything completed, in good working order, of good material, with accurate workmanship, skillfully fitted, and properly connected and put together.

14. Order of Work.—The work shall be carried on at such places and also in such order of precedence, as may be found necessary by the contracting officer, and shall be constructed in every part in exact conformity with the location and limit marks, which will be indicated by states, lines, marks, or otherwise. The contractor may be required to suspend work at any time and where for any reason such marks cannot be followed.

15. Inspection.—(a) The work will be conducted under the general direction of the contracting officer, and will be inspected by inspectors appointed by him, who will enforce a strict compliance with the terms of the contract. The inspectors will keep a record of the work done and see that the location and limit marks are kept in proper order; but the presence of the inspector shall not relieve the contractor or his responsible agent (see Article 8 of the contract) of any responsibility for the proper execution of the work. The contractor will be required to furnish, on the request of the inspector, the use of such transportation facilities, organization and material forming a part of the ordinary and usual equipment and crew of the contractor as may be reasonably necessary in inspecting and supervising the work.

(b) Should the contractor refuse, neglect or delay compliance with these requirements, the specific facilities may be furnished and maintained by the contracting officer, and

the cost thereof will be deducted from any amounts due or to become due the contractor.

(c) The contracting officer will furnish on the request of the contractor all location and limit marks reasonably necessary for the conduct of the work. Except as specified in this paragraph and in paragraphs 18 and 29, all expenses of inspection and superintendence will be borne by the United States.

(d) It is understood that any instructions or decisions given by a superior officer through the contracting officer, are to be considered instructions or decisions of the contracting officer in all cases where under the terms of the contract decision rests with the contracting officer.

[fol. 182] 16. Minor Modifications.—The right is reserved to make such minor changes in the execution of the work to be done under these specifications as, in the judgment of the contracting officer, may be necessary or expedient to carry out the intent of the contract provided that the unit cost to the contractor of doing the work shall not be increased thereby; and no increase in unit price over the contract rate will be paid to the contractor on account of such changes.

17. Purchase Orders.—Two copies of all purchase orders, showing firm names and addresses, and of all shipping bills or memorandums of shipment received, showing car initials and numbers when shipped by railroad, shall be furnished the contracting officer. Such orders, shipping bills or memorandums shall clearly indicate weights, and shall be so worded or marked that each item, piece or member can be definitely identified on the drawings.

18. Lines, Grades, Stakes, Templates, etc.—The contractor shall, at his own expense, furnish all stakes, templates, patterns, platforms and labor that may be required in setting and cutting, or laying out any part of the work. After lines and grades for any part of the work have been given by the Government inspectors the contractor will be held responsible for the proper execution of the work to such lines and grades, and all stakes or other marks given shall be preserved by him until authorized to remove them by the inspector. The contractor shall take such measurements as may be necessary to insure that the forms for

masonry are held to the lines and grades established by the inspector.

19. Progress, Organization and Plant.—(a) The contractor shall employ an ample force of men and provide construction plant properly adapted to the work and of sufficient capacity and efficiency to accomplish the work in a safe and workmanlike manner at the rate of progress specified in his bid. (See "Information to be Submitted" in the Invitation for Bids). All plant shall be maintained in good working order and provision shall be made for immediate emergency repairs. No change in the plant employed on the work, which would have the effect of decreasing its capacity below the capacity of the plant named in the bid, shall be made except by written permission of the contracting officer. The measure of "capacity of the plant" shall be its actual performance on the work to which these specifications apply. It is understood that award of this contract shall not be construed as a guaranty by the United States that plant listed in statement of contractor for use on this contract is adequate for the performance of the work.

[fol. 183] 19. (b) Should the contractor fail to maintain the rate of progress which he proposes in his bid, the contracting officer will require that additional men and/or plant be placed on the work, or a reorganization of plant layout be effected in order that the work be brought up to schedule and maintained there. Should the contractor refuse or neglect to so increase the number of men and/or plant, or reorganize the plant layout in the manner satisfactory to the contracting officer, the latter will proceed under the provisions of Article 9 of the contract form.

20. Grounds.—The contractor shall have the privilege of using Government land at the site (shown on sheet 10/4) not otherwise reserved. It is understood, however, that the contractor shall, without expense to the United States and at any time during the progress of work when needed for other purposes, promptly vacate and clean up any part of the Government grounds that have been allotted to or have been in use by him, when directed to do so by the contracting officer. A previous contractor at this site has constructed an office, a warehouse and a blacksmith shop. The contractor may utilize these buildings during the period of this contract should he so desire, but in any event he shall

remove them from the site after his work is completed and prior to final acceptance. The contractor shall keep his buildings and grounds in use by him at the site of the work in a sanitary condition. Suitable extinguishers or fire-fighting apparatus shall be provided for ready use in all buildings erected or in use by the contractor on Government ground.

21. Interference with Other Contractors.—The contractor for this work shall not interfere with material, appliances or workmen of the United States, or of any other contractor who may have work at this site. As far as practicable, all contractors shall have equal rights to the use of all roads, grounds, and adjacent river. In case of disagreement regarding such use, the decision of the contracting officer shall govern.

22. Removal of Rubbish.—Before final payment is made, the contractor shall remove from the site, without expense to the United States, all rubbish, and/or unused material, temporary buildings, cofferdams, and other structures used by him in carrying on the work, shall fill all holes or cavities made for his convenience, and shall leave the whole in good order and condition, all as required by the contracting officer.

23. Obstruction and Danger Lights.—The contractor will be required to dispose his plant and to conduct the work in [fol. 184] such manner as to obstruct navigation as little as possible. The contractor shall, at his own expense, display lights continuously each night between sunset and sunrise and during fogs, upon all cofferdams, vessels, range piles driven, and other obstructions placed in the river by him during the progress of the work. These lights shall be placed to conform to the rules and regulations governing danger lights on the river in the engineer district in which the work is situated. The contractor shall be responsible for all damage resulting from neglect or failure to comply with the requirements of this paragraph. The work as a whole shall be so conducted as to permit navigation to pass the site at all times.

24. Damage.—Damage to Government property due to failure of the contractor to take reasonable precaution, and all loss or deterioration of or damage to the permanent work by flood, accident, or exposure prior to final accept-

ance, shall be made good by the contractor without expense to the United States, other than as specified in paragraph 11. He will also be held responsible for any damage done to adjoining property through his neglect or failure to protect properly the work and river banks.

25. Claim and Protests.—If the contractor considers any work required of him to be outside the requirements of the contract, or considers any record or ruling of the inspectors or contracting officer as unfair, he shall ask for written instructions or decision immediately and then file a written protest with the contracting officer against the same within 10 days thereafter, or be considered as having accepted the record or ruling. (See Articles 3 and 15 of contract).

26. Liability of the Contractor.—The contractor will be responsible that his employees strictly observe the laws of the United States affecting operations under the contract. He will comply with the laws of the United States and of the States as to the inspection of hulls, boilers, and other equipment, and the licensing of masters, engineers, and other members of the crews of his vessels. It is further understood and agreed that the contractor assumes full responsibility for the safety of his employees, plant and materials. He shall conform to such sanitary requirements as may be prescribed by the contracting officer. (See Article 10 of contract).

27. Patents.—The contractor shall hold and save the Government, its officers, agents, servants and employees, harmless from liability of any nature or kind, including costs and expenses for or on account of any patented or unpatented invention, article or appliance manufactured [fol. 185] or use in performance of this contract, including their use by the Government, unless otherwise specifically stipulated in this contract.

28. Standard Stock Articles. (a) All articles, fittings, equipment and supplies shall, wherever practicable, and unless otherwise specified or required, be manufacturer's standard stock articles, of reliable make.

(b) The products of manufacturers, other than those herein specified, will be accepted when it is proven to the satisfaction of the contracting officer that they are equal in strength, durability, usefulness and convenience for the

purpose intended; that they have been well known with equal favor for at least 3 years; and that replacement parts may be readily obtained.

29. Standard Tests and Guaranty.—(a) All materials, supplies and parts and assemblies thereof, entering into the work to be done under these specifications, shall be tested as specified or otherwise required, in conformity with the best modern, approved methods for the particular type and class of work.

(b) Unless waived in writing by the contracting officer, all tests and trials shall be made in the presence of a duly authorized representative of the contracting officer. When the presence of the inspector is so waived, sworn statements, in duplicate, of the tests made and the results thereof, shall be furnished the contracting officer by the contractor.

(c) All costs of all tests and trials, excepting the expenses of the inspector, shall be borne by the contractor and will be included in the contract price.

(d) All materials, machinery, parts and equipment shall be of the highest grade, free from defects and imperfections, of recent manufacture, and unused. Workmanship shall be of the highest grade and in accordance with the best modern standard practice.

(e) Guaranty.—The contractor shall guarantee all machinery, parts and assemblies thereof, and all other standard manufactured articles permanently installed under this contract, against defective materials and workmanship for a period of at least one year from the date of final acceptance of the complete work, and any part proving defective within that time shall be promptly replaced or remedied at the expense of the contractor.

[fol. 186] 30. Storage of Materials.—All materials and equipment delivered at the site shall be adequately housed or otherwise protected against corrosion and damage. If any material stored at the site and partly paid for be not adequately protected by the contractor, no further partial payments will be made and the material will be kept protected by the contracting officer at the expense of the contractor.

31. Approval.—This contract shall be subject to the written approval of the Chief of Engineers, United States Army, and shall not be binding until so approved.

[fol. 187] Detail Specifications

Section I—Cofferdams, Excavation, Foundations and Fill

1-01. General.—From investigations, including surveys, soundings and borings made at the site, it is assumed that conditions are approximately as indicated on the drawings, but the nature of the materials, the depth to satisfactory foundations or depth to which it may be necessary to drive piling, and the stability of the river bed or banks, are not guaranteed. (See "Investigation of Conditions" in the invitation for bids.)

1-02. Lock and Dam Cofferdams.

(a) General.—The entire work, with the exception of the upper guide wall of the lock, shall be constructed within cofferdams. The lock-cofferdam shall be constructed as indicated on sheet 90/1B, utilizing the existing section of cofferdam between the intermediate wall and the bank for the upper arm. That portion of the upper guide wall extending outside of the cofferdam is designed to permit its construction without a cofferdam. Should the contractor so desire, however, he may also construct the guide wall within a cofferdam. No separate payment will, however, be made for any such additional cofferdam.

(1) The cofferdam for the dam shall be constructed in 2 sections as indicated on sheet 90/2. Cofferdam No. 1 shall be adjacent to the locks and shall inclose 2 roller gates (Nos. 1 and 2) and their piers. Cofferdam No. 2 shall inclose the remainder of the dam (3 gates and their piers).

(2) Construction of Cofferdam No. 2 shall be begun only upon authority from the contracting officer. It shall not be begun until all work within Cofferdam No. 1 is completed and both gates are in satisfactory operating condition, and Cofferdam No. 1 entirely or partially removed so that adequate discharge area will be provided to pass the natural flow of the river.

(b) Type.—Except as provided in paragraph 1-04, all cofferdams shall consist of two rows of interlocked, steel

sheet piling driven to refusal in rock, with suitable banking. [fol. 188] The 2 rows of piling shall be reinforced and braced longitudinally, and adequately tied together by rods or cables before filling. The cofferdams shall be built to elevation 601.6 which is 10 feet above the normal pool above Dam No. 3, Kanawha River. The base width of any cofferdam shall be at least equal to its height unless equal stability is otherwise provided.

1-02. (c) Measurement and Payment.—Payment for the cofferdams will be made on the basis of the "payment length," in linear feet, of the permanent work inclosed by the cofferdam. The total number of linear feet of cofferdam to be paid for will be 1134.0 for the Lock and 584.0 for the Dam, as indicated on drawings referred to in paragraph 3, except in case the length of the permanent work so inclosed be decreased or increased, then the cofferdam to be paid for will decrease or increase in a corresponding amount unless otherwise specified. Since payments are based on the linear feet of permanent work inclosed, the price per linear foot bid should be such as will cover the cost plus profit for all the cofferdam reduced to unit prices per linear foot of permanent work as indicated.

(d) Partial Payments.—Estimate will be given for 75 per cent for the construction and maintenance of a section of cofferdam when it is completed and entirely pumped out, so that work may proceed on any part of the permanent work to be built therein. The remaining 25 per cent will be estimated when the inclosed work is completed and accepted, and the section of cofferdam entirely removed. In removing the cofferdam, the banking and filling shall be deposited as specified for the disposal of excavated material. (See par. 1-06 (f).) All piling, tie-rods, timber, etc., except as specified below, shall become the property of the contractor.

(e) Removal of existing cofferdam.—The existing cofferdam above at the upper end of Lock "B" shall be removed by the contractor. The steel sheet piles in this cofferdam will become the property of the United States and shall be stored at the site as directed by the contracting officer. Payment for removal of this cofferdam will be included in item "Cofferdam—Lock B."

1-03. Auxiliary Cofferdam.

(a) General.—During the construction of the dam, navigation will be passed through Lock "A". After the dam is completed, the pool will be raised to elevation 603.0 and navigation passed through Lock "B". An auxiliary cofferdam, located approximately as indicated on sheet No. 90/2, shall then be constructed to inclose the work to be done in Lock "A".

[fol. 189] 1-03. (b) Type and Dimensions.

(1) The upper arm of this cofferdam shall be of the same type and dimensions specified in paragraph 1-02 (b), and built with top not lower than elevation 606.0, which is 3.0 feet above the pool required to pass navigation through Lock "B".

(2) The lower cofferdam closure shall be made by erecting the emergency dam indicated on sheet No. 30/1B. On completion of the work, the girder and needles comprising the emergency dam shall be dismantled and returned to the United States in good condition and stored at the site as directed by the contracting officer. Any damage done to the girder or timbers during their use by the contractor shall be repaired to the satisfaction of the contracting officer without cost to the United States.

(c) Payment.—Payment for the auxiliary cofferdam will be made at the lump sum bid for "Cofferdam—Auxiliary" after all work within has been completed and accepted and the cofferdam removed. The price bid shall include the entire cost plus profit of constructing the upper cofferdam, erecting the emergency dam, all pumping and maintenance during construction, and the complete removal and disposition of the materials.

1-04. Change in Type of Cofferdam.—If the above-described cofferdams are not satisfactory to the contractor, he may, with the approval of the contracting officer, build any other type of steel-piling cofferdam, provided, however, that the substituted structure shall have stability at least equal to that specified, and that the cost to the United States shall not exceed the contract rates and totals for the type specified.

1-05. Plans for Cofferdams to be Submitted.—The contractor shall submit for approval of the contracting officer,

prints, in triplicate, showing plans of the cofferdam he proposes before making any provision for its construction, but approval of such plans will not relieve the contractor of the responsibility for its adequacy.

1-06. Excavation.

(a) Attention is invited to the great depth of excavation required for the land and lower guide walls of Lock "B", [fol. 190] and the consequent danger of caving or sliding banks should ordinary excavating methods be used. The excavation for the walls shall be done by the trench method or some other method offering equal assurance of safety. The method proposed to be used shall be approved by the contracting officer prior to initiation of any work in this section, but such approval will not relieve the contractor of the full responsibility for the proper and safe execution of the excavation. In any event, payment for this excavation will be made in accordance with the provisions of subparagraphs (g) and (h) below.

1-06. (b) Character of Materials.—The material to be removed is believed to be as shown by the borings (Sheet No. 10/5). In the event that materials, structures, or obstacles of a materially different character are encountered during the progress of the work, and the cost of their removal or satisfactory treatment obviously would be, in the opinion of the contracting officer, either in excess of, or less than the unit price bid by the contractor, the contracting officer, in either alternative, will then proceed in accordance with the provisions of Article 4 of the contract or any authorized revision thereof.

(c) Classification.—Excavation will be classed either as common excavation or rock excavation. Common excavation shall include all materials which may be removed without blasting by hand, power shovel, clamshell buckets or dredge. All materials requiring drilling and blasting for their removal shall be classed as rock excavation. Boulders or loose rocks exceeding 9 cubic feet in volume will be classed as rock excavation.

(d) Blasting.—Care should be exercised in blasting so as not to injure persons or property. If, in the judgment of the contracting officer, conditions require it, the area to be blasted shall be suitably covered to prevent damage from flying fragments.

(e) Shoring.—Shoring may be used in making excavations at the option of the contractor and with the consent of the contracting officer. Shoring as such will not be paid for, but an estimate for excavation will be given as though the cut had been made to the slope lines mentioned below.

(f) Disposal.—The price bid for excavation will cover also the disposal of the excavated material. Waste material shall be deposited in the river along the left shore at a point approximately one-half mile above the upper end [fol. 191] of the upper guard wall of the lock.

1-06. (g) Measurement.—A survey of the river bed and banks will be made just prior to the beginning of work on the contract, and all measurements for excavation will be based on this survey without regard to any change in the bed that may occur during the prosecution of the work. Measurements will be made between the slope lines noted on the drawings and the ground surface as shown by the above-mentioned survey. The contractor must remove material which has been deposited since the above-mentioned surveys by floods or other causes and no payment will be made for such excavation. The slope lines of one on one shown on the drawings indicate only the lines to which excavation and fill will be measured and paid for under the contract and are not intended to and do not represent the actual slopes to which the excavations must be made to safely perform the work. The actual slopes necessary may be greater or less than one on one, depending on the material excavated and methods used in performing the work. Measurements for rock excavation will be made for the actual quantity in cubic yards excavated within the lines of the permanent work as shown on the drawings, or such modification of these lines as directed by the contracting officer. The grade lines or elevations to which the rock shall be excavated will be established by the contracting officer. No payment will be made for any rock which it becomes necessary to excavate below such grade lines solely due to injury caused by unnecessary drilling and blasting and all rock thus removed shall be replaced with concrete at the expense of the contractor.

(h) Payment for excavation will be made at the respective contract prices per cubic yard for "Excavation—Common" and "Excavation—Rock."

1-07. Rock Channeling.—(a) In all cases of rock excavation for concrete walls and keyways in the foundation, the vertical face of the excavation shall be made by a channeling machine. When approved by the contracting officer, suitable drilling and broaching outfits may be used in lieu of channeling machines. All rock excavation adjacent to channeled faces shall be removed in shallow lifts and short sections in such manner that the channeled faces of the keyways will not be disturbed.

(b) Payment for channeling or drilling and full-broaching will be made at the contract price per square foot for "Channeling—Rock." Payment for the rock removed will be made at the contract price per cubic yard for "Excavation—Rock."

[fol. 192] 1-08. Foundations.—The character and positions of the proposed foundations for the different parts of the work are shown on the drawings. The United States, however, reserves the right to increase the depth, width or strength of the foundations, if, in the opinion of the contracting officer, conditions require such modifications. (See par. 1-06(b).) All rock foundations shall be freed from loose pieces, thoroughly cleaned and worked down to a solid bed satisfactory to the contracting officer.

1-09. Drilling Grouting Holes.—(a) Holes for grouting and testing the foundations, not less than 2 inches in diameter, shall be drilled into the bed rock or concrete foundation monoliths at such points as shown on the drawings or as may be directed by the contracting officer. Grout holes shall normally be drilled and the grouting done well in advance of concreting operations. After a foundation course has been poured, at least one test hole shall be drilled in each monolith, through the concrete and into the rock.

(b) Payment for drilling will be made at the contract price per linear foot for "Drilled Holes—Grouting," at their respective depths.

1-10. (a) Grouting of the bed rock will be done through the test or grout holes in such areas as appear, in the judgment of the contracting officer, to require such treatment. Grouting equipment capable of placing either neat cement grout or thin sand-cement mortar under pressures up to 100 pounds per square inch shall be used. The proportions

and consistency of the grout or mortar and grouting pressure will be determined in the field and will be governed by the conditions encountered.

(b) Payment for grouting will be made at the contract price per barrel of cement, or fraction thereof, used for "Grouting." No extra allowance will be made where sand-cement mortar is used instead of neat cement grout or for changes in the proportioning of the grout or mortar used.

1-11. Fill.

(a) [redacted]terials.—Fill, except where otherwise specified, shall be made with rock, sand, gravel or suitable earth, free from logs drift or perishable materials in quantities considered excessive by the contracting officer. The fill under green concrete shall be sand, gravel or other material suitable for that purpose. Fill shall be brought to the grade lines shown on the drawings and properly dressed to smooth, regular surfaces.

(b) Measurement for fill will be made on the basis of material in place after settlement between the original sur- [fol. 193] face or the excavation slope lines and the slope or grade lines as indicated on the drawings. Material required to be excavated under these specifications and which is used for fill, will also be paid for as fill.

1-11. (c) Payment will be made at the contract price per cubic yard for "Fill."

Section II—Piling, Timber Work, and Protection Stone

2-01. Steel Sheet-Piling Cut-Off Walls.

(a) General.—

(1) A steel sheet-piling cut-off wall approximately 80 feet long, shall be constructed from the upper end of the land wall into the original bank, as indicated on sheets 10/4 and 20/3B. The piling shall be driven to rock unless otherwise authorized or required by the contracting officer. The top of the wall shall be at elevation 617.0.

(2) A steel sheet-piling cut-off wall, driven to refusal in rock, shall be constructed for the upper guide wall of the lock, as indicated on sheet 20/7B.

(3) (Contingent Work)—A steel sheet-piling cut-off wall consisting of 3 cells 30 feet in diameter, and approximately

150 linear feet of straight wall, driven to refusal in rock, shall be constructed from the upper end of pier No. 6 into the bank, as indicated on sheet 40/22. The top of the wall shall be not lower than elevation 622.0 and shall have a watertight, interlocked connection to the nose of the pier.

(b) Type and Properties of the Piling.—The piles shall have a minimum thickness of metal of ⅜ inch except that a reasonable reduction for shaping of the jaws of the interlock will be permitted. The piles shall provide a section modulus of not less than 3.0 and shall weigh not less than 30.4 pounds per foot of wall. The interlocked joint shall develop a strength in direct tension of not less than 10,000 pounds per lineal inch of interlock without rupture. The piles shall be continuously interlocked throughout their entire length and shall be provided with pulling holes. They shall be of structural steel, manufactured by the open-hearth process. The steel shall have an ultimate tensile strength of not less than 70,000 pounds per square inch, and neither [fol. 194] the sulphur nor phosphorus content shall exceed 0.06 per cent. Tests shall be the same as required for structural steel under Section IV. The type and dimensions of the piles proposed to be furnished shall be approved in writing by the contracting officer before any order for delivery is given by the contractor.

2-01. (c) Driving.—The piles shall be driven so as to form a continuous diaphragm. A protecting cap shall be used in driving and the hammers shall be of suitable sizes and types. The piling shall be driven to refusal in rock and as true to line and grade as possible. Proper precaution shall be taken to prevent rupture at the interlocks or other injury, and any piles so injured shall be removed and replaced by new piles at the expense of the contractor.

(d) Measurement and Payment.—The piling will be measured by the square feet of wall actually in place below the specified grade line. Payment will be made at the contract price per square foot for "Piling—Steel Sheet." The contract price will cover all necessary material, machinery and labor for driving the piles to grade or refusal. A preliminary estimate of 40 per cent of the contract price will be paid for piling delivered and accepted on the work, provided these piles are stored and protected from corrosion in a manner satisfactory to the contracting officer. Piles

which are delivered more than four months before the time when they may be reasonably expected to be driven shall be given 1 coat of red lead paint as specified in paragraph 4-45 before being stored and before being included in the preliminary estimate. No preliminary payment will be made for piles delivered prior to the calendar year in which they may be reasonably expected to be used. The remainder of the contract price will be paid when the piling has been driven and accepted. Proper deduction will be made in the final estimate for any preliminary payments made for piles not used in the work. The contractor will be paid $1.30 for each pile cut off by direction of the contracting officer. Cut-offs shall become the property of the contractor and shall be removed from the work.

2-02. Timber Piling.

(a) General.—

(1) The upper guide wall of the lock shall be supported on round timber piles approximately 25 feet in length. Where found necessary due to foundation conditions, certain sections of the concrete sewer adjacent to the land wall shall be supported on round timber piles 15 feet in length.

(2) (Contingent Work)—The concrete footings and bases for the storage facilities for the emergency bulkhead shall [fol. 195] be supported on round timber piles 30 feet in length.

(3) Where driving conditions clearly indicate that specified lengths cannot be driven, shorter lengths may be furnished by mutual agreement between the contractor and contracting officer.

2-02. (b) Quality.—Round piles shall be of Norway pine, beach, oak, white ash, hickory, hard maple, rock elm, or other suitable hardwood. Cypress, jack pine, cedar or hemlock piles will not be acceptable. All piles shall conform to the Tentative Standard Specifications of the American Society for Testing Materials for "Timber Piles," Serial Designation D25-30T, "Second-class Piles," except that all piles shall be peeled.

(c) Placing and Driving.—The piles shall be located as indicated on the drawings and shall be driven to grade or refusal, without injury to the pile. The driving equipment

shall be of proper and suitable size and type. Piles which are split, broomed or otherwise injured below the cut-off elevation so as to impair them for the purpose intended, shall be replaced by new piles at the expense of the contractor. No followers or spliced piles shall be used except where unexpected conditions make it necessary to drive the piles to greater depths than the lengths of the piles furnished in order to develop the proper supporting power. After driving, all piles shall be cut off square at the "cut-off" grade line and such cut-offs shall become the property of the contractor and shall be removed from the site of the work.

(d) Payment will be made at the contract price per linear foot for "Timber Piles" in place after they have been cut off to grade. If it is found impracticable to drive piles of the specified length or of the length mutually agreed upon (see (a)-(3) above), the cut-off portion of each pile will be paid for at the rate of 25 per cent of the price bid. No piles will be paid for twice and the length of cut-off portion of each pile to be paid for shall not exceed the difference between the length shown plus one foot and the length driven below the cut-off elevation; except that in case spliced piles are used by direction of the contracting officer, the actual length cut off will be paid for.

2-03. Timber.

(a) Quality.—All timber shall be cut from live, thrifty trees. It shall be straight, even-sawed, square-cornered, sound and entirely free from all defects which may impair its durability or its usefulness for the purpose intended.

[fol. 196] 2-03. (b) Common Timber for cribs shall be of fir, hemlock, pine, or other wood of equal quality, and shall conform to the latest rules of the respective American Associations under which these species are graded for "No. 1 Common Timbers."

(c) Yellow Pine.—Timber for the pipe bulkheads and the service bridge shall be dense, southern yellow pine, conforming to the standard specifications of the Southern Pine Association for "Structural, Square Edge and Sound Grade." It shall be creosoted in accordance with the U. S. Government Master Specification No. 395, empty cell treatment, grade No. 1, creosote oil, pressure process.

(d) Oak Timber.—Timber for miter and roller gates, sills and emergency bulkheads shall be of white oak conforming to the latest specifications of the National Hardwood Lumber Association for "Select Car Stock" timber.

(e) Framing.—All timber shall be accurately framed and fitted and securely bolted or spiked together as shown on the drawings. Drift bolts shall be driven in holes of 1/16 inch less diameter than the body of the bolt. Care shall be taken in framing to work out permissible defects wherever possible.

(f) Painting.—The ends of all timbers intended for permanent incorporation in the work shall be painted thoroughly with red lead as soon as delivered on the work and the timber shall be stored and suitably protected to prevent excessive checking.

(g) Measurement and Payment.—Unless otherwise noted, all timber will be measured in accordance with standard commercial grading rules and on the basis of the dimensions given on the drawings. No deductions will be made for tapers, grooves, etc. The contract price will include nails and spikes less than 3/8 inch in diameter, and all carpenter work. Payment for all timber except the oak water seals of the roller gates will be made at the contract price per thousand board feet (M.B.M.) for the respective species. Payment for oak water seals of the roller gates will be included in the lump sum bid for that item.

2-04. Stone.

(a) Riprap shall be of a good, durable stone approved by the contracting officer. In general, the individual stones shall not weigh over 200 pounds and not more than 10 per cent of the whole shall be formed of pieces weighing under 15 pounds, well distributed throughout the mass. Crib filling shall be rough, unhewn, quarry-run stones of proper shapes and sizes to form a reasonably compact mass. Where used for bank protection, riprap shall be hand placed to form a section as indicated and with a regular surface. The [fol. 196½] spaces between the larger stones shall be carefully filled with smaller stones so as to form a dense compact mass.

2-04. (b) Derrick stone protection shall consist of large heavy stones weighing between 500 pounds and 4,500

pounds, placed where shown on the drawings or required by the contracting officer. The stones shall be carefully placed to form a section as indicated and to provide a fairly even surface. The spaces between the larger stones shall be filled with smaller stones and riprap so as to form a compact mass.

(c) Measurement.—Stone will be measured by volume in place within the lines as indicated on the drawings. The net interior dimensions of the pockets in the cribs, without including the spaces between vertical rows of timbers, shall be used in measuring riprap for crib filling. No payment will be made for derrick stone required to replace excavation below the slope lines as indicated except in the case of additional protection specifically ordered in writing by the contracting officer. Where actual measurement of the volume in place is impracticable, measurement will be determined by conversion of weight into cubic yards. The weights may be determined by actual scale weights on cars or by displacement measurements on barges, and 3,000 pounds will be considered to be the weight of one cubic yard of stone in place. Weights of stone on barges will be determined by the displacement of barges loaded with stone less displacement of the empty barges, with weight of a cubic foot of water as 62.5 pounds.

(d) Payment for riprap and derrick stone will be made at the contract price per cubic yard for "Stone-Riprap and Derrick."

Section III—Concrete

Materials

3–01. Cement.

(a) Quality.—Cement shall conform to "Federal Specifications for Cement; Portland," file SS-C-191, October 14, 1930.

(b) Testing.—Cement shall be tested by some recognized testing bureau satisfactory to the contracting officer. Samples to be tested shall be taken either at the mills or at the work. The contractor shall arrange and pay for the testing and shall furnish the contracting officer certified copies of all test reports. No cement shall be used until notice has been given by the contracting officer that the tests are satisfactory. Cement which has been stored more than 4 months

after being tested shall be retested before use. Ordinarily, [fol. 197] no cement shall be used until after it has satisfactorily passed the 28-day tests, but in cases of emergency the contracting officer may waive the 28-day tests and permit the use of cement which has satisfactorily passed the soundness and 7-day tests, provided it is the product of a quarry and mill having established a reputation for high grade cement of not less than 3 years' standing.

3–02. Fine Aggregate.

(a) Composition.—Fine aggregate shall be a natural sand.

(b) Quality.—Fine aggregate shall consist of hard, strong, durable and uncoated particles. It shall be such that mortar briquettes, prisms, or cylinders made with 1 part by weight of Portland Cement to 3 parts by weight of fine aggregate, will show tensile or compressive strengths at 7 and 28 days not less than those of similar specimens made with standard Ottawa sand mortar, of the same proportion and consistency, and with the same cement.

(c) Size.—Except as provided in (d) below, fine aggregate shall be well graded from fine to coarse and the grading shall fall within the following limits:

	Per cent by weight
Passing ⅜ inch sieve	100
Passing No. 4 sieve	95–100
Passing No. 16 sieve	35– 75
Passing No. 50 sieve	7– 25
Passing No. 100 sieve	0– 5

(d) The contractor may substitute for aggregate conforming to the above grading, a fine aggregate and an admixture (see par. 3-05), in which case the fine aggregate shall be reasonably well graded from fine to coarse and shall be such that at least 90 per cent will pass a No. 4 sieve, not more than 20 per cent nor less than 5 per cent will pass a No. 50 sieve, and not more than 5 per cent will pass a No. 100 sieve.

(e) Tests.—Fine aggregate subjected to the colorimetric test for organic impurities and producing a color darker than the standard shall be rejected or washed sufficiently to enable it to pass. The sum of percentages of shale, coal,

clay lumps and other deleterious substances shall not exceed 5 per cent by weight.

3-03. Coarse Aggregate.

(a) Composition.—Coarse aggregate shall be a good quality of washed gravel, or crushed stone.

[fol. 198] 3-03. (b) Quality.—Coarse aggregate shall consist of hard, tough and durable particles free from adherent coating, vegetable matter and soft, friable thin or elongated particles. The sum of percentages of shale, coal, clay lumps and other deleterious substances shall not exceed 5 per cent by weight. Aggregate which has disintegrated or weathered badly under exposure conditions similar to those which will be encountered by the work under consideration, shall not be used. When crushed stone is used the crusher shall be equipped with a screening system which will entirely separate the dust from the stone and convey it to a separate bin.

(c) Size.—Coarse aggregate shall be well graded so that concrete of the required workability, density and strength can be made without the use of an excess amount of sand, water or cement. The grading of the coarse aggregate shall fall within the following limits:

	Per cent by weight
Passing (maximum size) inch screen	95–100
Passing (½ maximum size) inch screen	40– 70
Passing No. 4 sieve	0– 6

The maximum size of aggregate shall be ¾ inch for Class "A" concrete and 3 inches for Class "B" concrete.

(d) Tests.—Where the concrete in the finished work will be exposed to contact with salt water or spray, or alkali soils or waters, or similar destructive agents, the coarse aggregate shall be subjected to the sodium-sulphate accelerated soundness test. However, aggregate failing to pass this test may be used with the approval of the contracting officer, provided it has given satisfactory service for a period of not less than 5 years under exposure conditions similar to those to which it will be subjected in the proposed work.

3-04. Rubble and Cyclopean Aggregate.—Hard, tough, and durable rubble or Cyclopean aggregate may be used in mass concrete, with the following limitations:

(a) Each stone shall be at least ½ cu. ft. in volume and free from adherent coatings, fissures or planes of cleavage.

(b) A minimum of 12 inches of concrete shall separate all mass-stones from permanent, exposed faces, and from each other.

(c) Each stone shall be carefully placed (not dropped or thrown onto the concrete) and, in general, at least 25 per cent of its mass shall be imbedded into the concrete when concreting is temporarily suspended at the limit of a course.

[fol. 199] 3-05. Admixture.—(a) An admixture, if used (see par. 3-02(d)), shall be of a quality approved by the contracting officer. The use of an admixture, which, in the opinion of the contracting officer, may have an injurious effect on the strength and density of the concrete, will not be permitted. Before approval of any admixture, the contractor will be required to submit the results of chemical and sieve analysis made by an acceptable testing laboratory. Subsequent tests will be made of samples taken by the contracting officer from the supply of the admixture being used on the work to determine whether the material is uniform in quality with that approved.

(b) The admixture shall be inert material finely ground into particles, and in conformity with the following requirements:

Free moisture—a total of not more than 3 per cent by weight.

Water solubles and organic matter—a total of not more than 5 per cent by weight.

Passing No. 30 sieve—not less than 100 per cent by weight.

Passing No. 200 sieve—not less than 85 per cent by weight.

(c) Forty pounds of cement in addition to the minimum requirements for that material (see par. 3-11(d)) may be substituted for an admixture, should the contractor so desire.

3-06. Water.—The water used in mixing concrete shall be fresh, clean and free from injurious amounts of oil, acid, alkali or organic matter.

3-07. Storage.

(a) Cement.—Immediately upon receipt at the site of the work, cement shall be stored in a thoroughly dry, weathertight and properly ventilated building or barge with adequate provisions made to prevent the absorption of moisture. Storage shall be such as to permit easy access for inspection and definite identification of each shipment.

(b) Aggregates.—The fine and coarse aggregates shall be stored separately and in such manner as to avoid the inclusion of any foreign material in the concrete. Stock piles of coarse aggregate shall be built in horizontal layers to avoid segregation.

3-08. Sampling and Testing.—Except where provided otherwise by these specifications, all sampling and tests of all materials shall be made in accordance with the latest [fol. 200] standards adopted by the American Society for Testing Materials. Unless specified otherwise, all test samples shall be supplied by the contractor at his expense and all tests shall be made by and under the supervision of the Government at its expense. The source from which concrete aggregates are to be obtained shall be selected by the contractor will in advance of the time when they will be required in the work, and suitable samples, as they are to be used in the concrete, shall be furnished to the contracting officer at least 15 days in advance of the time when the pouring of the concrete is expected to begin.

Proportioning, Mixing and Placing

3-09. Composition of Concrete.—Concrete shall be composed of cement, fine aggregate and coarse aggregate well mixed and brought to a workable consistency by the addition of water. (See par. 3-02.)

3-10. Classification.

(a) Designation.—In general, concrete will be divided into 2 classes—Class "A" and Class "B".

(b) Application.—Unless otherwise specified, Class "A" shall be used for thin, reinforced sections where flexural and

axial stresses govern the design; and Class "B" shall be used for thick reinforced sections and mass sections. In all cases the plans will show the class of concrete to be used.

(c) Strength.—The mixes will be designed to secure concrete having the following minimum compressive strengths at the age of 28 days:

Class "A"—3,000 lbs. per sq. in.
Class "B"—2,400 lbs. per sq. in.

The average compressive strength at the age of 28 days as shown by averaging the breaking tests of any 25 consecutive test cylinders, shall be not less than the following:

Class "A"—3,800 lbs. per sq. in.
Class "B"—3,200 lbs. per sq. in.

(d) High-Early-Strength Concrete.—High-early-strength Portland Cement shall be used only when specifically authorized. The same methods of proportioning and mixing as specified herein for Classes "A" and "B" concrete shall apply. A 7-day compressive strength of the high-early-strength concrete shall be equal to the 28-day strength herein specified for each class of ordinary concrete.

[fol. 201] 3-11. Proportioning.

(a) Method.—All classes of concrete shall be proportioned by the water-cement ratio method.

(b) Control.—The exact proportions of all materials entering into the concrete shall be determined by the contractor at frequent intervals, as directed by the contracting officer. The contractor shall provide all equipment necessary to positively determine and control the relative amounts of the various materials. The proportions shall be changed whenever the test specimens prescribed in paragraph 3-13 indicate the compressive strength of the concrete to be below that specified and when otherwise necessary to obtain the desired density, uniformity and workability, and the contractor shall not be compensated because of such changes.

(c) Measurement.—Cement shall be measured by weight or by bag. One bag of cement will be considered as 94 pounds in weight. Aggregates and admixture shall be measured by weight. Water shall be measured by weight or by volume.

(d) Cement Content.—Each cubic yard of concrete shall contain the following minimum volume of cement:

Class "A"—6 bags.
Class "B"—5 bags.

Where the concrete in the finished work will be in contact with sea water, alkali waters, or alkali soils, and for concrete deposited under water, the minimum cement content shall be 7 bags to each cubic yard of concrete in place.

(e) Water Content.—In calculating the volume of water in any mix, the free moisture contained in the aggregate will be included in the total water content. The total water content per bag of cement for each batch of concrete shall not exceed the following

Class "A"—5.5 gallons.
Class "B"—6.5 gallons.

In all cases, however, the amount of water to be used shall be the minimum amount necessary to produce a plastic, workable mixture of the strength specified. In no case shall the slump be less than 2 inches nor more than 7 inches.

An increase in the maximum water content, based only on the requirements of an admixture, will not be permitted unless comparative tests under job conditions show conclusively that the increase in water content does not result in a decrease in concrete strength.

[fol. 202] 3-11. (f) Aggregate Content.—The amount of aggregates in each batch shall be that necessary to produce a smooth, dense, workable mixture.

(g) Admixture.—An admixture, if used (see par. 3-02 (d)), shall be in such proportion as to provide a workability equivalent to the use of 40 pounds additional cement.

3-12. Mixing and Placing.

(a) Equipment.—The contractor shall provide at the site of the work a modern and dependable batch-type mixing plant with a minimum capacity of 300 cubic yards of concrete per 8 hours. The plant shall include not fewer than 2 complete mixers with separate power plants, having a minimum capacity of 1 cubic yard each. The equipment shall provide adequate facilities for the accurate measurement and control of each of the materials entering the con-

crete. The complete plant assembly, including the adequacy and dependability of each of its parts, shall be subject to the approval of the contracting officer, and shall comply with the following requirements:

(1) It shall be capable of ready adjustment for compensating for the varying moisture content of the aggregates or for changing the proportionate batch weights.

(2) It shall be capable of controlling the delivery of material to within 1 per cent by weight of the specified amounts of cement, water and admixture; and 2 per cent by weight of the specified amounts of the aggregates.

(3) It shall be arranged to permit the convenient removal of material in excess of the specified tolerances.

(4) It shall include a visible dial or equally suitable device which will accurately register the scale load at any stage of the weighing operation from zero to full capacity.

(5) The accuracy of the weighing equipment shall conform to the requirements of the U. S. Bureau of Standards.

(6) It shall include a device for accurately measuring and indicating the quantity of water entering the concrete and the operating mechanisms must be such that leakage will [fol. 203] not occur when the valves are closed.

(7) It shall include a device for accurately and automatically measuring and indicating the time requred for mixing.

(8) It shall include a "batch-meter" or a device for recording and indicating the number of batches handled.

3-12. (b) Time.—The minimum time for mixing each batch, after all materials are in the mixer, shall be as follows:

½ cu. yd. mixer, or smaller	1¼ minutes.
¾ to 1½ cu. yd. mixer	1½ minutes.
Larger than 1½ cu. yd. mixer	2 minutes.

The mixer drums shall revolve a minimum of 12 revolutions per minute after all materials have been placed in it, and at a uniform speed. Neither speed nor capacity of the drums shall exceed that recommended by the manufacturer. Excessive overmixing, requiring additions of water to preserve the required consistency, will not be permitted.

(c) Conveying.—Concrete shall be conveyed from mixer to forms as rapidly as practicable by methods which will prevent segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position. Chutes used shall be such that the concrete slides in them and does not flow. Chutes with a flatter slope than 1 on 2 will not be permitted. There shall be no free vertical drop greater than 5 feet.

(d) Placing.—Concrete shall be placed before initial set has occurred, and in no event after it has contained its water content for more than 30 minutes. Unless otherwise specified, all concrete shall be placed in the dry upon clean, damp surfaces, free from running water, and never upon soft mud, dry porous earth or frozen earth, or upon fills that have not been subjected to approved puddling or tamping so that ultimate settlement has occurred. Rock surfaces shall be approximately horizontal or stepped, rough and free from loose material or other matter interfering with a satisfactory bond. The rock shall be washed, scrubbed with steel brushes or brooms and spread with a layer of mortar about ½-inch thick immediately before the concrete is placed. The mortar shall be of the same cement-sand ratio as used in the concrete. Concrete in mass structures shall be poured in alternate monoliths not exceeding approximately 40 feet in length or width. The layout of all monoliths shall be approved by the contracting officer before concreting is commenced. The concrete shall be deposited in approximately horizontal layers not to exceed 18 inches in thickness, the concreting being carried on as a continuous operation, as far as practicable, until the plac- [fol. 204] ing in the section, panel or course is completed. Courses shall generally have a minimum thickness of 4 feet, and a maximum of 18 feet. In the walls of buildings, courses including door and/or window openings shall terminate at the tops of the openings, except that in constructing the power house, the courses shall terminate at the horizontal construction joints shown on the drawings. The concrete shall be compacted and worked in an approved manner into all corners and angles of the forms and around reinforcement and embedded fixtures. Where required by the contracting officer special pneumatic vibrating or tamping devices shall be used. Care shall be taken in dropping concrete through reinforcement so that no segregation of

the course aggregate occurs. On flat surfaces where the congestion of steel near the forms makes placing difficult, a mortar of the same cement-sand ratio as is used in the concrete shall be first deposited to cover the forms. All top surfaces shall be carried slightly above the forms and struck off by board finish when the water settlement has taken place. Care shall be taken to see that all excess water is forced out and removed in making this finish.

3-12. (e) Construction Joints.—Vertical joints shall be formed with tongue-and-groove bond or keys. Horizontal joints shall be formed with keys, or, where horizontal pressure is always in one direction, with steps. When specified in water-tight construction, copper strips not less than 14 inches in width and weighing not less than 20 ounces per square foot, properly crimped or bent, shall be placed in the concrete to span the joint. Where required, dowel rods shall be used. All concrete in vertical members shall have been in place not less than 8 hours before concrete in horizontal members resting thereon is placed. Before placing is resumed all excess water and laitance shall be removed and the concrete shall be cut away, where necessary, to insure a strong dense concrete at the joint. The surface of existing concrete shall be cleaned and roughened and then shall either be spread with a ½-inch layer of mortar of the same cement-sand ratio as used in the concrete, or broomed with neat cement, immediately before the new concrete is deposited.

(f) Under Water.—When specifically authorized, concrete may be deposited under water having a temperature above 35° F. The methods and equipment used shall be subject to approval. When deposited by the tremie method the tremie shall be water-tight and sufficiently large to permit a free flow of concrete. The discharge end shall be kept continuously submerged in the concrete and the shaft kept full of concrete to a point well above the water level. When the bottom-dump-bucket method is used, the bucket shall not be dumped until after it has come to rest on the surface upon which the concrete is to be deposited. The bucket shall be provided with a suitable cover, and the bottom doors, when tripped, shall open freely. The bucket shall be completely filled and slowly lowered to avoid backwash, [fol. 205] and when tripped it shall be slowly withdrawn

until entirely free of the concrete. With either method, concreting shall proceed without interruption until the top of the concrete is well above the water surface.

3-12. (g) Cold Weather.—Concrete shall not be placed when the ambient atmospheric temperature is below 35° F., or, in the opinion of the contracting officer, likely to be subjected to freezing temperatures before final set has occurred, unless specifically authorized. When so authorized, the materials shall be heated so that the temperature of the concrete when deposited shall be not less than 50° F. nor more than 100° F. Salt or other chemicals shall not be admitted into the mixture to prevent freezing.

3-13. Test Specimens.

(a) Number.—Test specimens to determine whether the compressive strength of the concrete is in accordance with that specified in par. 3-10(c) will be taken by the inspector. At least 1 specimen will be made for every 500 cu. yds. of concrete, but a sufficient number of specimens will be taken to give a comprehensive knowledge of the concrete in each section of the work.

(b) Method.—All specimens will be taken from the concrete as it is placed in the forms and in accordance with the latest methods of the American Society for Testing Materials. The specimens will be tested by and at the expense of the United States, either in its laboratory or in that of a recognized commercial testing agency.

3-14. Finishing.—(a) Green concrete shall be properly forked back along the faces of all forms by use of standard concrete forks or spades. The finished surfaces shall be free from voids and the plastering over of such surfaces will not be permitted. Defective concrete will be repaired by cutting out the unsatisfactory material and placing new concrete which shall be formed with keys, dovetails or anchors to attach it securely to the other work. This concrete will be drier than the usual mixture and shall be thoroughly tamped in place. Unless otherwise specified, all top surfaces of concrete shall have a board float finish without mortar, and shall be true to elevations as shown on drawings. Where considered necessary by the contracting officer, or where called for by the drawings, joints shall be carefully made with a jointing tool. Every precaution

shall be taken by the contractor to preserve finished surfaces from stains or abrasions. No fire shall be kindled on concrete. Concrete surfaces or edges likely to be abraded during construction period shall be properly protected by leaving the forms in place, or by suitable covers of planking.

(b) Floor Surfaces.—Unless otherwise specified, floors [fol. 206] and exterior ramps for all buildings, and other surfaces where indicated on the plans or required by the contracting officer, shall be finished with a 1-inch monolithic sand-cement mortar surface. All water, laitance and any foreign matter shall be removed from surfaces. The topping mixture shall be spread evenly over the base within 45 minutes after the base has been placed. The mortar shall be of 1 part cement and 2 parts approved clean coarse sand. The cement and sand shall be thoroughly mixed dry and then sufficient water shall be added to produce a medium stiff mortar. After placing, the mortar shall be floated to a true surface with a wood float and steel-trowelled to a smooth finish. Trowelling shall be a minimum consistent with obtaining a smooth dense surface and shall not be done until the mortar has hardened sufficiently to prevent excess fine material from being worked to the surface.

3-15. Curing.

(a) Warm Weather.—All concrete shall be adequately protected from injurious action by the sun. Fresh concrete shall be protected from heavy rains, flowing water, and mechanical injury. All concrete shall be kept moist for a period of not less than 10 days by covering with water, or with an approved water-saturated covering, or by spraying. Where wood forms are left in place for curing, they shall be kept sufficiently damp at all times to prevent opening at the joints and drying out of the concrete.

(b) Cold Weather.—Concrete when placed under cold weather conditions, as specified herein (see par. 3-12(g)), shall be provided with adequate protection, subject to approval, so that the air in contact with the concrete will be maintained at a temperature of between 50° and 70° F. for a period of at least 7 days, during which the concrete shall be kept damp.

Forms, Reinforcement and Payment

3-16. Forms.

(a) Materials.—Forms shall be of wood, steel or other approved material, except that where form lining is not specified the sheeting for all exposed surfaces shall be tongue-and-groove lumber of uniform width. The type, size, shape, quality and strength of all materials of which the forms are made shall be subject to the approval of the contracting officer.

(b) Construction.—Forms shall be built true to line and grade, and shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports. Responsibility for their adequacy shall rest with the contractor. Their surfaces shall be smooth and free from ir- [fol. 207] regularities, dents, sags, or holes when used for permanently exposed faces. Bolts and rods used for internal ties shall be arranged so that when the forms are removed all metal shall be not less than 2 inches from any surface. Wire ties will not be permitted where the concrete surface will be exposed to weathering and discoloration will be objectionable. All forms shall be constructed so that they can be removed without hammering or prying against the concrete. Unless otherwise indicated, suitable moldings shall be placed to bevel or round exposed edges, and at expansion joints or any other points where required by the contracting officer.

3-16. (c) Coating.—For exposed surfaces the forms shall be coated with a nonstaining mineral oil which shall be applied shortly before the concrete is placed therein. For unexposed surfaces the forms may be thoroughly wetted immediately before the placing of concrete in lieu of oiling, except that in freezing weather oil shall be used.

(d) Removal.—Forms shall not be removed without the approval of the contracting officer, and all removal shall be accomplished in a manner such as to prevent injury to the concrete. Forms shall not be removed before the expiration of the minimum number of days indicated below, except by permission of the contracting officer. When, in the opinion of the contracting officer, conditions on the work

are such as to justify it, forms may be required to remain in place for longer periods.

Arches and beams	14 days.
Slabs and columns	7 days.
Walls and vertical faces	2 days.

(e) Form Lining for Power House and Operating Houses.—In addition to the requirements for formwork specified above, the forms for both sides of all walls of the Power House and Operating Houses shall be lined with pressed wood sheets, "Masonite" or approved equal. They shall be applied directly to the sheeting. Window and door jambs and their flat or arched soffits shall also be lined and the corner intersections chamfered. Joints of the lining shall be neat and close and no patch pieces, cleats, or blocking will be permitted. Overrun of lining shall be made to secure proper fit to adjoining surfaces by trimming. Lining with bruises, imprints, or hammer marks shall not be used.

3-17. Reinforcement.

(a) General.—The contractor shall furnish and install all reinforcement, including rods, fabric and structural shapes, as indicated on the plans or otherwise required. All reinforcement shall, when placed, be entirely free from rust, scale, grease or other coating which might destroy or reduce the bond with concrete. Shop drawings, lists and bending [fol. 208] details shall be furnished if required.

3-17. (b) Minimum spacing of rods.—The clear distance between parallel rods shall be not less than one and one-half times the diameter of round rods, or twice the side dimensions of square rods, and, unless specifically authorized, shall in no case be less than 1 inch.

(c) Protective Covering.—Except where otherwise shown, reinforcement shall be placed as follows:

(1) All main reinforcement shall be placed not less than 4 inches from any surface except in the sewer and in the bridge seats which shall be not less than 3 inches, and in buildings.

(2) All main reinforcement in walls and slabs of buildings exposed to the weather and in fire-resistant construction, shall be placed not less than 1 inch from the surface in walls, and slabs, 1½ inches in floor beams, and 2 inches

in girders and columns. In interior flat-slab construction, the minimum cover may be reduced to ¾ inch. For interior work where fire hazard does not exist, the main reinforcement shall be placed not less than ¾ inch from the surface in walls and slabs, 1 inch in floor beams and 1½ inches in girders and columns.

(3) The covering of stirrups, spacer-rods, and similar secondary reinforcement may be reduced to a diameter of such rods. The above dimensions shall be measured from the face of the reinforcement to the face of the forms.

(d) Splicing.—Where splices in reinforcement, in addition to those indicated, are necessary, there shall be sufficient lap to transfer the stress by bond, as may be directed. Rods shall be lapped not less than 40 diameters and adjacent rods shall not be spliced at the same point. The lapped ends of rods shall be separated sufficiently or connected properly to develop the full strength of the rod. Adjacent sheets of mesh reinforcement shall be spliced by lapping not less than 6 inches, the lapped ends being securely wired together.

(e) Supports.—All reinforcement shall be secured in place true to line and grade as indicated, by the use of metal or concrete supports, spacers or ties as approved by the contracting officer. Such supports shall be of sufficient strength to maintain the reinforcement in place throughout the concreting operation, and shall be used in a manner so they will not be exposed on the face or in any way discolor [fol. 209] or be noticeable in the surface of the finished concrete. The costs for furnishing and placing all supports required will be included in the contract prices for the various types of reinforcement.

3-17. (f) Protection for future use.—Exposed reinforcement intended for bonding with future work shall be protected from corrosion by heavy wrappings of burlap saturated with bituminous material.

3-18. Embedded Items.—Before placing concrete, care shall be taken to determine that any embedded metal or wood parts are firmly and securely fastened in place as indicated. They shall be thoroughly clean and free from coating rust, scales, oil, or any foreign matter. The embedding of wood in concrete shall be avoided whenever possible, metal being

used instead. If wood is allowed, it shall be thoroughly wetted before the concrete is placed.

3-19. Expansion Joints.—Expansion joints shall be constructed at such points and of such dimensions as may be indicated or required. The method and materials used shall be subject to approval and the materials shall conform to the latest specifications of the American Society for Testing Materials. Unless otherwise indicated on the drawings or required by the contracting officer, the expansion joints shall be made by the use of asphaltic, smooth-surfaced, ready roofing. For concrete poured when the atmospheric temperature is above 50° F., the joints shall be made with light weight roofing, weighing 35 pounds per square, and when the temperature is below 50° F., the joints shall be made with heavy weight roofing, weighing 55 pounds per square.

3-20. Measurement and Payment.—(a) The payment for concrete of the various classes called for shall include the use of all equipment, tools, material, falsework, forms, bracing, expansion joint filler, mortar, surface finish, labor, and all other items required to complete the concrete work, except the reinforcement and specified embedded items which will be paid for separately. Payment will be made at the contract unit prices on the basis of actual volume within the lines of the structure as shown on the plans, except for the power house and the operating houses for which payment for the concrete is included in the lump sum bid for each house. (See Sections XI & XV.)

(b) In measuring concrete for payment no deductions will be made for rounded or beveled edges or space occupied by metal work, or for voids less than 5 cubic feet in volume or less than 1 square foot in cross-section.

3-21. Sawdust Concrete.—The concrete indicated as a filler in roofs shall be of the approximate proportions of 4 bags of cement to 7 cubic feet of sand and 3.5 cubic feet of sawdust, mixed as required by the contracting officer. Test blocks shall be made by and at the expense of the contractor [fol. 210] before the concrete is placed on the power-house roofs to determine the correct proportions of the ingredients to obtain a sawdust concrete of proper qualities for nailing and permanently supporting the roof tiles. The cement and sand shall conform to the requirements for reg-

ular concrete herein. The sawdust shall be cuttings of pine timber and shall be coarse and clean and free from dust, shavings and sticks. The top surface of the concrete shall be finished smooth and even and have a uniform slope to the gutters.

Section IV—Metal Work, Materials, Tests, Workmanship and Painting

4-01. Structural Steel, unless otherwise specified, shall conform to the standard specifications of the American Society for Testing Materials, for "Structural Steel for Bridges," serial designation A-7-29. Shapes, plates, bars, pins and bolts shall be of "Structural" grade and rivets shall be of "Rivet" grade, unless otherwise required. All requirements of these specifications shall govern. Steel for steel sheet piling shall be in conformity with the above specifications except that it shall have a minimum tensile strength of 70,000 pounds per square inch. Sheet steel for shims shall be paid for under this item.

4-02. Nickel Steel for structural purposes, unless otherwise specified, shall conform to the standard specifications of the American Society for Testing Materials, for "Structural Nickel Steel," serial designation A-8-29, with tensile strength not less than 96,000 pounds per square inch, except for rivets which shall have a tensile strength not less than 80,000 pounds per square inch.

4-03. Chrome-vanadium Steel, unless otherwise required, shall conform to the standard specifications of the American Society for Testing Materials, for "Chrome-vanadium Bars for Railway Springs," serial designation A-60-27.

4-04. Chrome-Nickel Steel shall conform to the standard specifications of the American Society for Testing Materials, for "Carbon-Steel and Alloy-Steel Blooms, Billets and Slabs for Forgings," serial designation A-17-29, "Type F," Alloy steel, "Grade 13," "Class 1," as follows: Carbon 0.20-0.30 per cent, nickel 3.25-3.75 per cent, and chromium 1.25-1.75 per cent. It shall be carburized in accordance with the recommended practice of the American Society for Testing Materials, for "Carburizing and Heat Treatment of Carburized Objects," serial designation A-37-27 for S. A. E. Steel No. 3325, and given a slight spring temper.

4-05. Cold-Rolled Steel shall conform to the standard specifications of the American Society for Testing Materials, for "Commercial Cold-Finished Bar Steels and Cold-[fol. 211] Finished Shafting," serial designation A-108-30, "Open-hearth" grade "25-35 carbon." It shall have an ultimate tensile strength of not less than 65,000 pounds per square inch. Physical properties shall be determined by a standard turned test specimen of one-half inch diameter and two inches long, gaged length, cut from any part of the piece. In machining and grinding the fabricated pieces, care shall be exercised that an equal amount of the surface skin is removed from all sides. Each piece shall be accurately straightened and centered and all journal surfaces polished. (Pins, rods, keys, etc., shall be of this material unless otherwise specified.)

4-06. Tool Steel shall conform to the standard specifications of the American Society for Testing Materials for "Carbon Tool Steel," serial designation A-71-26, with the following chemical properties:

	Per cent
Carbon	0.45—0.55
Manganese	0.50—0.80
Phosphorus	0.04 Max.
Sulphur	0.05 "

Unless otherwise indicated, it shall be normalized.

4-07. Stainless Steel.

(a) Stainless steel for rods, bars and forgings shall conform to tentative specifications of November 30, 1931, for steel, corrosion resisting Grade 1 (superseding U. S. Navy Department Specification 46 S 18, June 1, 1928). Bolts shall conform to Grade 1 with physical characteristics of Grade 1A. All bolts after heading shall be annealed at a temperature of not less than 1800 degrees F. and cooled rapidly. Nuts shall be of Grade 1 with the addition of metallic sulphides to produce nonseizing qualities.

(b) Stainless steel for plates, sheets and strips shall conform to Navy Department specifications No. SPS 853 for steel, corrosion resisting, Grade 1.

4-08. Spring Steel.

(a) Steel for springs shall conform to the standard specifications of the Amerieaa Society for Testing Materials, for

"Carbon Steel Bars for Railway Springs with Special Silicon Requirement," serial designation A-68-27.

(b) Springs shall conform to the standard specifications of the American Society for Testing Materials for "Helical Steel Springs for Railways," serial designation A-61-16.

[fol. 212] 4-09. Machine Steel shall conform to the standard specifications of the American Society for Testing Materials for "Commercial Quality Hot-Rolled Bar Steels," serial designation A-107-30, "Open-Hearth" grade ".15-.25 Carbon" or ".20-.30 Carbon."

4-10. Key Steel shall conform to the standard specifications of the American Society for Testing Materials for "Commercial Cold-Finished Bar Steel and Cold-Finished Shafting," serial designation A-108-30, "Open-Hearth Screw" grade. This is commercial steel S. A. E. No. 1120.

4-11. Reinforcing Steel.

(a) Rods.—Reinforcing rods shall be billet steel, deformed, conforming to the standard specifications of the American Society for Testing Materials, for "Billet Steel Concrete Reinforcement Bars," serial designation A-15-30, "Intermediate" grade.

(b) Fabric.—Woven or electrically welded wire fabric of the weight indicated or specified shall have meshes not greater than 6 x 8 inches with a minimum diameter of wire of 0.192 inch. The wire shall conform to the standard specifications of the American Society for Testing Materials, for "Cold-Drawn Steel Wire for Concrete Reinforcement," serial designation A-82-27.

4-12. Forgings.

(a) Steel forgings, unless otherwise specified, shall conform to the standard specifications of the American Society for Testing Materials for "Carbon Steel and Alloy Steel Forgings," serial designation A-18-30. "Class C" shall be furnished for all forgings other than operating machinery parts which shall be "Class E" except that shafts of this material shall be S. A. E. No. 1045, hot-rolled, open-hearth steel forging bars.

(b) Nickel Steel Forgings shall conform to the above A. S. T. M. Specifications, serial designation A-18-30, "Class

I," S. A. E. No. 2340. Steel with S. A. E. heat treatment VII may be furnished for this class of forging.

(c) All shafts shall be ground on centers and all journal surfaces polished. Unless otherwise authorized by the contracting officer, each piece shall be within 5 per cent of the weight as calculated from the drawings.

4-13. Steel Castings.

(a) Steel castings shall conform to the standard specifications of the American Society for Testing Materials for "Steel Castings," serial designation A-27-24, Classes "A" [fol. 212a] and "B," corner protection and armor castings shall be Class "A" and all others Class "B." "Soft," "Medium" and 'Hard" grades shall be furnished for the operating machinery parts, the "soft" grade to be furnished unless otherwise indicated on the drawings.

4-13. (b) Nickel Steel for castings shall be of the same chemical composition as required under par. 4-02, except for operating machinery parts, which shall conform to the chemical requirements for nickel steel forgings under par. 4-12(b). Each casting shall be annealed and shall have the heat number cast upon it. At the option of the contractor, forgings may be substituted for castings.

(c) Unless otherwise authorized by the contracting officer, each casting shall be within 5 per cent of the weight as calculated from the drawings.

4-14. Iron Castings.

(a) Unless otherwise indicated, all cast iron shall conform to the standard specifications of the American Society for Testing Materials, for "Gray-Iron Castings," serial designation A-48-29. These specifications shall cover manufacture, physical properties, tests and finish. Tensile tests and chemical analysis will not be required. Each casting shall have the heat number cast upon it. Unless otherwise authorized by the contracting officer, each casting shall be within 5 per cent of the weight as calculated from the drawings.

(b) Malleable Iron Castings shall conform to the standard specifications of the American Society for Testing Materials, for "Malleable Castings," serial designation A-47-30. Small pipe fittings may be accepted at 40,000 pounds for

square inch tensile strength and without the formalities of the above specifications as to inspection and tests.

4-15. Bronze.

(a) Phosphor bronze shall be in conformity with the standard specifications of the American Society for Testing Materials for "Bronze Bearing Metals for Turn-tables and movable Railroad Bridges, serial designation B-22-21, Class "C," except for power house machinery parts which shall be Class "D."

(b) Tobin bronze, unless otherwise specified, shall be rolled bar stock with a tensile strength of not less than 60,000 pounds per square inch, or in conformity with the standard specifications of the American Society for Testing Materials, for "Naval Brass Rod for Structural Purposes," serial designation B-21-29. Cast bars will not be accepted.

[fol. 212b] 4-15. (c) Valves and Fittings shall conform to the standard specifications of the American Society for Testing Materials, for "Composition Brass or Ounce Metal Sand Castings," serial designation B-62-38.

(d) Springs.—Phosphor bronze wire for springs shall conform to Specification No. 81 of the Society of Automotive Engineers, for "Phosphor Bronze Wire."

4-16. Brass.

(a) Sheets and Rolled or Drawn Shapes shall be hard brass in conformity with the standard specifications of the American Society for Testing Materials for "Sheet High Brass," serial designation B-36-27.

(b) Castings shall conform to the standard specifications of the American Society for Testing Materials for "Yellow Brass Sand Castings for General Purposes," serial designation B-65-28.

(c) Pipe shall conform to the standard specifications of the American Society for Testing Materials for "Brass Pipe, Standard Sizes," serial designation B-43-24.

(d) Screws and Bolts shall be of material conforming to the standard specifications of the American Society for Testing Materials for "Free Cutting Brass Rod for Use in Screw Machines," serial designation B-16-29.

4-17. Copper.

(a) Plates for gear guards shall conform to the standard specifications of the American Society for Testing Materials, for "Copper Plates for Locomotive Fire Boxes," serial designation B-11-18, "Non-Arsenical."

(b) Tubing for gasoline lines P2 and P3 shall be of the sizes required on sheets 71/7, 71/8, 71/9 and 71/13. The ends of tubes shall be fitted into standard flared-tube pipe unions. The tubing shall be annealed. The ⅞-inch O. D. tube shall be No. 16 gage (.065 inch) and the ½-inch O. D. tube shall be No. 18 gage (.049 inch). Otherwise, the tubing shall comply with the standard specifications of the American Society for Testing Materials for "Seamless Copper Tubes," serial designation B-75-30.

4-18. Zinc shall conform to the standard specifications of the American Society for Testing Materials for "Slab Zinc," serial designation B-6-18, "Selected" grade.

[fol. 213] 4-19. Zinc Coatings (Hot Galvanizing), unless otherwise specified or permitted, shall conform to the standard specifications of the American Society for Testing Materials for "Zinc Coatings (Hot Galvanized) for Structural Steel Shapes, Plates, Bars and Their Products," serial designation A-123-30, wherever applicable.

4-20. Babbitt Metal shall conform to the standard specifications of the American Society for Testing Materials, for "White Bearing Metal Alloys," serial designation B-23-26, alloy grade "No. 6" for lock gates, and alloy grade "No. 3" for the Stoney gate valve and operating machinery bearings. It shall be poured in accordance with the best modern, standard practice. Grade No. 6 shall be poured at 665° F. and Grade No. 3 at 915° F.

4-21. Bolts, Screws and Washers.

(a) Threaded bolts, nuts and screws, where indicated as "Bolt Steel," shall be of steel made in conformity with the standard specifications of the American Society for Testing Materials for Commercial Quality Hot-Rolled Bar Steel, serial designation A-107-30, "Open-Hearth" .25-.35 Carbon grade, except that small screws may be of the "Open-Hearth, Screw" grade. Where not otherwise designated they shall be of "Structural Steel." Where designated

"R", and unless otherwise specified, all bolts shall be made by rolling, up-setting, and die forging, without welding. When used in connection with washers or finished surfaces, the heads of bolts shall be hexagonal unless otherwise indicated. All nuts shall be hexagonal and in each case semi-finished. Bolts designated "T" or indicated to be finished, shall be machine finished, and the holes for such bolts shall be reamed. Unless otherwise indicated, a clearance of 0.010 inch will be allowed in holes for the finished bolts, which shall be fitted therein. The threads for all bolts shall be U. S. Standard, machine cut or die chased to a medium or Class III fit, unless otherwise indicated. Rolled, pressed, or defective threads will not be accepted. Cut washers shall be of structural steel as specified in paragraph 4-01. Ogee washers shall be of cast iron. Brass screws and bolts shall be of material as specified under paragraph 4-14.

(b) Drift bolts, unless otherwise indicated or permitted, shall be round, with points and flat heads.

(c) Safety Set Screws.—Where headless set screws are indicated, they shall be "Bristo" cup-point, safety set screws, or equal. Wrenches shall be furnished for all set screws. Eight wrenches shall be furnished for each 100 screws of each size, with a minimum of 2 wrenches for each size. The contract price will include all payment for such wrenches.

[fol. 214] 4-21. (d) Payment for all bolts, nuts and cut washers, expansion bolts, and all anchor rods, will be made at the contract price per pound for "Bolts," unless otherwise specifically provided for. Cast iron washers will be paid for at the contract price per pound for "Iron Castings."

4-22. Black Steel Plates, as specified for the cooling-water tank, shall conform to the Standard specifications of the American Society for Testing Materials, for "Steel Plates of Structural Quality for Forge Welding," serial designation A-78-30, Grade "B".

4-23. Corrugated, Galvanized Metal, unless otherwise indicated, shall be No. 22, U. S. Standard gage, conforming to the standard specifications of the American Society for Testing Materials, for "Zinc Coated (Galvanized) sheets," serial designation A-95-27, Class "B".

4-24. Galvanized Steel-Wire Screen, as specified for the cooling water tank, shall be of No. 16 gage steel wire, 2½ meshes to the inch. It shall be hot-galvanized, after weaving.

4-25. Steel Tubing shall be cold-drawn and seamless. The steel shall contain 0.20-0.30 per cent carbon and 0.40-0.65 per cent manganese, and not more than 0.04 per cent phosphorus nor 0.05 per cent sulphur. It shall have an elastic limit of not less than 50,000 pounds per square inch. Chemical and physical analyses shall be made.

4-26. Steel Pipe.

(a) Standard, Extra Strong and Double Extra Strong Black and Galvanized Steel Pipe shall be of standard commercial grade and sizes conforming to Federal Specifications WW-P-431 for pipe, welded steel, black and zinc coated. No certificate of tests will be required. Open ends shall be reamed. The pipe shall be straight, clean, and free from scale, rust, oil or other foreign matter. When listed on bills of material, random lengths may be furnished.

(b) Seamless steel pipe shall conform, including the tests, to the standard specifications of the American Society for Testing Materials, for "Welded and Seamless Steel Pipe," serial designation A-53-30.

(c) Fittings.—All flanged fittings, except for oil pressure lines, shall be standard weight, cast steel, faced and drilled. Flanged fittings for the oil pressure lines shall be extra heavy, cast steel, of the male and female face type, faced and drilled suitable for a working pressure of 500 pounds [fol. 215] per square inch. Screwed fittings, except for the high pressure air line, shall be standard weight, malleable iron, galvanized, plain type. The high pressure air line fittings shall be extra heavy, malleable iron, galvanized, banded type, suitable for air pressure of 500 pounds per square inch. All unions shall be ground joint type.

4-27. (a) Cast Iron Pipe shall conform to the standard specifications of the American Society for Testing Materials for "Cast Iron Pipe and Special Castings," serial designation A-44-04, Class "B".

(b) Soil Pipe.—All cast iron pipe under 4 inches in diameter shall conform to the standard specifications of the

American Society for Testing Materials for "Cast Iron Soil Pipe and Fittings," serial designation A-74-29, bell-and-spigot joints.

4-28. Handrailing.

(a) Quality and fittings.—All handrailing shall be of standard weight steel pipe, dimensioned and supported as indicated on the drawings. The fittings shall be of malleable iron, ball pattern, and shall have screw or pinned slip joints as indicated. The cap screws shall be of Tobin Bronze.

(b) Payment will be made at the contract price per linear foot for "Handrailing," measured along the top rail between centers or posts, or to face of walls, at ends of each section. The contract price bid will include embedded supports with cap screws, but will not include anchor bolts or reinforcing rods.

4-29. (a) Steel Grating, for recess covering or floors, shall be a standard manufactured product of the dimensions and loading capacity indicated on the drawings. The longitudinal bars shall be rigidly and amply supported transversely by either welded or riveted members. It shall be of structural steel. No chemical or physical tests will be required but it will be subjected to rigid surface inspection at the site of the work.

(b) Payment will be made at the contract price per pound for "Steel—Structural."

4-30. Steel Wire Cable shall be of the lubricated hemp center, regular lay type with 6 strands of 37 wires each. It shall be of high grade, acid open-hearth plow steel having a tensile strength of not less than 230,000 pounds per square inch. It shall be equal to the "Monitor Silver Strand—Type S" manufactured by the American Steel and Wire Co., or Roeblings "Blue Center" grade and shall comply in all respects with the U. S. Government Master Specification No. 297, "Type S," high grade plow steel. Manufac- [fol. 216] turer's sworn certificate of tests will be required to show that the cable furnished is in conformity with the above requirements.

4-31. Hardware for the power house and operating houses shall be brass or bronze of the size and type indi-

cated or required, conforming to Federal Specification FF-H-101 for "Builders' Hardware," Finish U. S. 4.

Inspection and Tests

4-32. Shop Inspection.—The contractor shall keep the contracting officer informed as to the commencement and progress of the work. He shall at all times permit Government inspectors to have free access to all parts of mills, foundries or shops where work is being carried on under the contract and shall provide the necessary facilities and assistance for making thorough examinations. The acceptance of any material or finished member by an inspector shall not prevent subsequent rejection if such material or member is later found to be defective.

4-33. Lists of Materials.—The contractor shall furnish the contracting officer copies of all orders for material. The contractor shall also furnish a shipping bill or memorandum of each shipment of finished pieces or members, giving the designating mark and weight of each piece, the number of pieces, the total weight, and if shipped by rail, the car initials and number. Copies or orders, certificates of tests and shipping bill shall be mailed to the United States Engineer Office, Charleston, W. Va.

4-34. Tests.

(a) The contractor shall make analyses and/or tests to determine that all materials are in conformity with the specifications. Such analyses and/or tests shall be made as indicated in the respective specifications or as otherwise required. (See paragraph 29).

(b) The contractor shall furnish the contracting officer certificates listing the heat numbers and the chemical and physical properties of the metal from which each article or piece of the material was made. There shall also be furnished 2 lists, 1 from the shops indicating what pieces or members are to be made from the material ordered, and the other from the mills indicating what pieces or members are furnished from each heat or melt.

(c) The following materials shall be tested in accordance with the standard specifications of the American Society for Testing Materials, respective serial designations as listed, and/or the requirements stated in the respective paragraphs listed:

[fol. 217]

	A.S.T.M. Serial Designation	Paragraph
Structural Steel	A 7–29	4–01
Nickel Steel	A 8–29	4–02
Chrome-vanadium Steel	A 60–27	4–03
Chrome-Nickel Steel	A 17–29	4–04
Cold-Rolled Steel	A 108–30	4–05
Tool Steel	A 71–26	4–06
Stainless Steel	.....	4–07
Spring Steel	A 68–27 & A 61–16	4–08
Machine Steel	A 107–30	4–09
Key Steel	A 108–30	4–10
Reinforcing Steel	A 15–30	4–11
Steel Forgings	A 18–30	4–12
Steel Castings	A 27–24	4–13
Nickel-Steel Castings	A 8–29	4–13
Iron Castings	A 48–29	4–14
Phosphor Bronze	B 22–21	4–15
Tobin Bronze	B 21–29	4–15
Bronze for Valves & Fittings	B 62–28	4–15
Spring Bronze	.....	4–15
Brass sheets	B 36–27	4–16
Brass Castings	B 65–28	4–16
Copper Tubing	B 75–30	4–17
Babbitt Metal	B 23–26	4–19
Black Steel Plates	A 78–30	4–21
Corrugated Galvanized Metal	A 93–27	4–22
Steel Tubing	.....	4–24
Cast Iron Pipe	A 44–04	4–26
Steel Wire Cable	.....	4–29

4-35. Patterns.—(a) Patterns made expressly for any of the various parts of the work to be done under this contract shall be well and substantially made, so that a number of molds can be made from each in the future. Complete sets of all such patterns, together with jigs, templates and core boxes shall become the property of the United States.

(b) The following patterns are available and are stored at the United States Repair Station, Marietta, Ohio:

Mark	Name	Drawing Number
PS2	Support for vertical pipes	20/13 B
PS1	Pipe support	20/13 B
CP2	Check post cap	20/14 B
CP3	" " "	20/14 B

[fol. 218]

LC1	Clevis	20/15 B
20/22 B–1	Signal standard base	20/22 B
20/22 B–2	Signal standard base cover plate	20/22 B
20/22 B–4	Lighting standard base	20/22 B
20/22 B–5	Lighting standard base cover plate	20/22 B

Approximately 40 patterns for the wall armor shown on sheet 20/11 B, of various lengths. Any new lengths or new patterns required for this armor must be furnished by the contractor.

Mark	Name	Drawing Number
QB1R	Quoin Bearing Casting	21/6 B
QB1L	" " "	"
QB4R	" " "	"
QB4L	" " "	"
QB2R	" " "	"
QB2L	" " "	"
QB6R	" " "	"
QB6L	" " "	"
QB5R	" " "	"
QB5L	" " "	"
QB3R	" " "	"
QB3L	" " "	"
MB3R	Miter Bearing Casting	"
MB5	" " "	"
MB2	" " "	"
MB6	" " "	"
MB1	" " "	"
MB4	" " "	"
MB7	" " "	"
MB10	" " "	"
MB8	" " "	"
MB12	" " "	"
MB11	" " "	"
MB9R	" " "	"
BB1	Bushing	21/7 B
OC	Strut Casting	"
PBR	Pintle Base	"
PBL	" "	"
BB3	Bronze Bushing	"
PCR	Pintle Casting	"
PCL	" "	"
PSR	Pintle Shoe	"
PSL	" "	"
WSR	Water Seals	"
WSL	" "	"
[fol. 219]		
BB2	Bronze Bushing	21/7 B
GM2–1	Sector & Bushing	22/3 B
GM2–2	Rack Section	"
GM2–3	Rack Connection	"
GM2–5	Rack Stop Bracket	"
GM2–6	Sector Arm & Bushing	"
GM3–1	Sector Connection	22/4 B
GM3–9	Buffer Spring Plate	"
GM3–10	Buffer Yoke Head	"
GM3–12	Buffer Yoke	"

Mark	Name	Drawing Number
GM3–14	Roller Housing	"
GM3–15	" "	"
GM3–16	Roller Bracket	"
GM3–18	Guide Roller	"
GM3–21	" "	"
GM3–22	" "	"
GM3–24	Bushing for GM3–1	"
GM4–1	Piston Follower	22/5 B
GM4–2	Piston	"
GM4–3	Cylinder	"
GM4–5	Piston Ring	"
GM4–6	Back Cylinder Head	"
GM4–7	Front Cylinder Head	"
GM4–8	Stuffing Box Gland	"
GM5–3	Thrust Washer	22/6 B
GM5–7	Guide Roller Bkt	"
GM5–8	Top Plate	"
GM5–9	Sector Base	"
GPA	Governor Body	22/7 B
GPC	Valve	"
GPB	Governor Body Cap	"
22/8–1	Double 4-way operating lever	22/8 B
22/8–2	Piston	"
22/8–3	Link	"
22/8–4	Separator	"
22/8–5	Stuffing Box Gland	"
22/9–1	Double 4-way Valve Body	22/9 B
22/9–2	Double 4-way Valve Body Opp. Hand	"
22/9–3	Valve Cover	"
22/9–4	" "	"
22/9–5	Valve Sleeve	"
24/5–9	Valve Blade Roller Bracket	24/5 B
24/5–10	Valve Blade and Stem Connection	"
24/5–11	Cable Bracket (slight change)	Pattern 24/12–12
24/6–1	Plunger Base	24/6 B
24/6–3	Plunger	"
[fol. 220]		
24/7–1	Main Cross Arm	24/7 B
24/7–2	Outer Section of Lower Cross Arm	"
24/7–3	Half Center of Lower Cross Arm	"
24/7–13	Gland	"
24/12–3	Bottom Separator	24/12 B
24/12–4	Intermediate Separator	"
24/12–12	Sheave (slight change)	Pattern 24/12–10
24/12–14	Shock Absorber Base	" 24/12–13
24/12–15	Cap for Shock Absorber	" 24/12–14
24/12–16	Spring Cap	24/12 B
24/14–1	Sliding Shoe (slight change)	Pattern 24/11–6
24/14–2	Upper Seal Casting	" 24/8–3
24/18–1	3-way Valve Cylinder	24/18–B
24/18–2	" " " Opp. Hand	"

Mark	Name	Drawing Number
24/18–3	Plunger Cap	"
24/18–4	Plunger Coupling	"
24/18–5	Cylinder Head	"
24/18–6	Outer Bushing	"
24/18–7	Valve Plunger (Pressure End)	"
24/18–8	Valve Plunger (Return End)	"
24/18–9	Inner Bushing	"
24/20–2	3-way Operating Lever	24/20–B
24/20–3	Link	"
24/21–1a 24/21–1b	Rocker Arm & Ct-wt. Chain Segment	24/21 B
24/21–2	Rocker Shaft Bearing	"
24/21–4	Control Rod Bracket	"
24/21–5	Clamp for Control Arm	"
24/21–6	Control Arm	"
24/21–9	Pipe Joint	"
24/21–10	Valve Shaft Lever	"
24/21–11	Valve Lever	"
24/21–12	Half Clamp Stop	"
24/21–13	Clevis for Vibrating Link	"
24/21–15	Counterweight Base	"
24/21–15a 24/21–15b	Counterweights	"
24/21–16	Spring Seat	"
24/22–1R, 1L	3-way Automatic Valve Body	24/22 B
24/22–2	Valve Plug	"
24/22–3	Valve Cover (Top)	"
24/2–4	Valve Cover (Bottom)	"
24/22–5	Top Gland	"
24/22–6	Bottom Gland	"
24/22–7	Bushing	"
71/10–1	Pipe Support	PS 8
71/10–25	Pipe Support	PS 11

[fol. 221] 4-35. (c) The patterns will be furnished free of charge to the contractor provided he pays the cost of transportation for obtaining the patterns from the United States and for returning them. These patterns are believed to be in good condition, but the contractor shall carefully check them, and, if any repairs or alterations are found necessary, such repairs or alterations shall be made by the contractor without additional cost to the United States.

(d) After use, all patterns shall be thoroughly cleaned, painted and crated and delivered in first-class condition to the United States Repair Station, Marietta, Ohio, together with a list of same, in duplicate, before final payment is made. Any pattern lost or damaged by the contractor, or in shipment, shall be replaced by the contractor without cost to the United States.

(e) Boxes and crates for patterns shall be substantially made and shall be put together with screws so that they can be used several times. Each box and crate shall be plainly marked to indicate its contents.

Workmanship

4-36. Straightening.—Before being laid off or worked in any way, the material shall be thoroughly straightened by methods that will not injure it. Finished members shall be free from kinks, bonds and winds.

4-37. Finish.—Shearing shall be neatly and accurately done, and all portions of the work neatly finished. Reentrant cuts shall be made in the best possible manner; where they cannot be made by shearing a rectangular punch may be used. Corners must be square and true. All bends, except for minor details, shall be made to cast iron dies. In heating, care must be taken not to burn the metal, which should be allowed to cool slowly. Steel with welds will not be accepted except where welding is definitely specified or called for on the drawings.

4-38. Rivets.—The size of rivets called for on the plans shall be understood to mean the actual size of the cold rivets before heating. Rivets shall be hot-driven with pressure tools wherever possible. Hand driving may be resorted to in such places only as are inaccessible to pneumatic tools. Rivets shall be neat and finished and shall have full heads of approved shape, full size, and concentric with shank. Recupping or calking will not be allowed. Loose, burned, or otherwise defective rivets shall be cut out and replaced. In cutting out rivets, care shall be taken not to injure the adjacent metal. If necessary, they shall be drilled out. Unless otherwise directed, all countersunk rivets shall be [fol. 222] chipped smooth. Rivets shall be uniformly heated to a light cherry red heat in a gas, oil or electric furnace so constructed that it can be adjusted to the proper temperature.

4-39. Turned Bolts.—Unless otherwise specified, where bolts are used instead of rivets, the holes shall be reamed parallel, and at least 3/32 inch larger than nominal size of rivets, while parts are assembled, and the bolts turned to a driving fit. A washer not less than ¼ inch thick shall be used under the nut where shown on the drawings or other-

wise required. The diameter of the threaded portion shall be 1/16 inch less than the diameter of the finished bolt.

4-40. Machine Work.—Machine work shall be done wherever an "F" or any word denoting machine finish appears on the drawings and at other places where necessary. Where the "F" follows a dimension both surfaces from which it is measured shall be machine finished so that they will be true and the dimension exact. The surfaces shall be finished with such smoothness and accuracy as to insure good workmanship when assembled.

4-41. Unfinished Surfaces.—As far as practicable all work shall be laid out to secure good matching of adjoining unfinished surfaces. Where there is a large discrepancy between adjoining unfinished surfaces, they shall be chipped or machined to secure proper alignment. Unfinished surfaces shall be true to lines and dimensions given on the drawings and shall be chipped or ground free of all projections and rough spots. Depressions or holes not affecting the strength or usefulness of the part may, with the approval of the inspector, be welded or filled with babbitt or a suitable iron cement.

4-42. Pin Holes.—Pin holes shall be bored true to gages, smooth and straight and at right angles to the axis of the member. The boring shall be done after the member is securely fastened in position by bolts or rivets as called for on the drawings.

4-43. Welding.

(a) The surfaces of all openings, seams or joints called for on the drawings to be welded and the other places approved by the contracting officer, shall be free from rust, scale and grease, and be beveled to form a V-shaped groove. Metallic electrodes of soft Norwegian or Swedish iron shall be used. Approved welding, unless otherwise specified, shall be in accordance with the current rules of the American Bureau of Welding.

(b) Welders who have not been certified within two years of date of signing the contract, will be required to pass [fol. 223] successfully the tests as prescribed by the American Bureau of Welding before being assigned to production work. The contractor shall bear the expense of conducting these tests, and shall certify by name, to the contracting

officer, welders who have successfully passed the prescribed tests. The contractor shall require any welder to repeat these tests when in the opinion of the contracting officer or his representative the work of the welder indicates a reasonable doubt of his efficiency. In such cases the welder shall be recertified as above if he successfully passes the retest; otherwise he shall be disqualified until he has successfully passed a retest.

4-43. (c) The assembly of all joints shall be such as to permit good welding. Welding shall not be used to close openings larger than those required for proper assembly.

4-44. Protection of Machined Surfaces.—All machine finished surfaces shall be thoroughly cleaned of foreign matter and coated with a composition of white lead and tallow or other approved slushing grease for protection against rust. As a further protection, pins and bolts shall be wrapped with burlap to prevent the removal of the coating.

4-45. Shop Painting.

(a) The surfaces of all steel and iron work, except electrical equipment, power house machinery, reinforcing rods, anchor rods, and embedded metal, shall be painted in the shop in the most thorough manner to prevent corrosion. All scale, rust, dirt, and oil shall be removed by scrapers, wire brushes, sand blast, or other effective methods. When the surfaces are perfectly clean, warm and dry, they shall be given 1 coat of red lead paint, except the mitering lock gates. The red lead shall be in conformity with specifications TT-R-191 of the Federal Specification Board for "Red Lead; Dry and Paste-in-Oil," 95 per cent grade, mixed as follows:

Red Lead (dry)	30 pounds
Linseed Oil	1 gallon
Turpentine (gum spirits)	2½ gills
Japan Drier	2½ gills

(The resultant weight of the mixture will be 26 to 28 pounds per gallon.)

(b) The mitering lock gates shall be given 1 coat of a bituminous priming solution similar and equal to the product of the Wailes Dove-Hermiston Corporation or the W. A. Briggs Bitumin Company.

(c) Electrical equipment, power house machinery and heating plant shall be painted in accordance with the standard practice of the manufacturer.

[fol. 224] 4-45. (d) All surfaces which will be inaccessible after riveting shall be given 1 coat of the same kind of paint before assembling.

4-46. Field Painting.

(a) After delivery on the work, all steel and iron shall be kept clean and free from rust. The surfaces of parts painted in the shop shall be repainted or retouched from time to time, when, in the opinion of the inspector, this becomes necessary, using paint of the quality specified for the shop coat.

(b) After erection, all rust spots, all places where the paint has been rubbed off and all field rivet heads shall be cleaned and painted with paint of the same quality specified for shop painting. When this has become dry, all unfinished, exposed steel and iron surfaces, not otherwise specifically provided for, shall be given two coats of red lead paint of slightly different shades.

(c) The service bridge, the needle-dam girder, the emergency bulkhead for both locks and the dam, all handrailing, all piping and tanks in the power house, all exposed metal work of the power house and operating houses including doors and windows, lock-lighting standards, the haulage units, and other exposed metal fixtures shall be given two coats of aluminum paint composed of two pounds of pigment to one gallon of vehicle, as follows:

Pigment.—"Standard Varnish Alcoa Albron Powder" manufactured by the Aluminum Company of America, or equal.

Vehicle.—Long oil varnish containing not less than 50 per cent by weight of nonvolatile oils and gums and in conformity with the requirements of specification TT-V-121 of the Federal Specification Board, for "Varnish, Spar, Water-resisting."

(d) The roller-gates, including both exterior and interior surfaces, and the stoney-valves, shall be given two coats of aluminum paint composed of two pounds of pigment to one gallon of vehicle, as follows:

Pigment.—"Standard Varnish Alcoa Albron Powder" manufactured by the Aluminum Company of America, or equal.

Vehicle.—

Chinawood (Tung) Oil	40-50 per cent
Resins	10-12 per cent
Mineral Spirit thinners	45-48 per cent

[fol. 224a] 4-46. (e) The aluminum field coats shall be applied by brush or spray. The first coat shall be allowed to dry at least forty-eight hours before application of the second coat. The second coat shall be allowed to dry not less than five days before being submerged in water.

(f) The mitering lock gates shall receive two coats of bituminous priming solution and one coat of bituminous enamel manufactured by the Wailes Dove-Hermiston Corporation or by the W. A. Briggs Bitumin Company, or equal, the enamel to have a thickness of about 1/16 inch. The enamel shall be applied hot after the priming solution has dried to a tacky consistency.

(g) All items of machinery in the power house shall be painted with two coats of machinery enamel similar and equal to the "Lusteral Enamel" No. 76, Grade "A", as manufactured by the Sherwin-Williams Company. The color shall be approved by the contracting officer. The heating plant shall be painted with an approved heat resisting paint.

(h) Both shop and field painting of the miter and roller gates and the stoney valves shall be done in accordance with the specifications of the manufacturer and under the supervision of his agents. In the case of contact surfaces in the shop, the supervision of the manufacturer's agent may be waived. In no case shall paint be applied in freezing, rainy or misty weather, and all surfaces to which paint is applied shall at the time be clean and dry. All work shall be done in a thorough, neat and workmanlike manner. The entire cost of all painting shall be included in the contractor's price bid for the respective metals or items painted.

4-47. Measurement and Payment.—All metal work for which payment is not otherwise specifically provided else-

where in these specifications, will be paid for by the pound as classified on the drawings. The prices bid shall cover all necessary material and work for placing, fabricating, and painting the metals indicated on the drawings or required in these specifications. Estimates for 60 per cent of the contract unit price will be made for all metal work when delivered and accepted at the site of the work, provided such material be stored and protected from corrosion in a manner satisfactory to the contracting officer. The remaining 40 per cent will be estimated when the material is incorporated in the work and accepted. If any material, so stored and partly paid for, be not kept protected in a manner satisfactory to the contracting officer, no further partial payments on metal work as provided for in this paragraph will be made, and the material will be kept protected by the contracting officer at the expense of the contractor. When purchased and paid for by weight, no payment will be made for structural steel and nickel steel in excess of a variation [fol. 224b] of 2½ per cent, and other material in excess of a variation of 5 per cent from the calculated net weight of any piece unless otherwise specifically authorized by the contracting officer. All brass, copper and bronze not included with items for which lump sum prices are paid, will be classified and paid for as "Bronze."

Unit Weight.—Metal work material, classified on page 4 by weights as calculated from the dimensions indicated on the drawings are as follows:

Nickel steel 0.285 lb. per cubic inch.
Bronze and brass 0.311 lb. per cubic inch.
Babbitt metal 0.270 lb. per cubic inch.
All other metal 0.283 lb. per cubic inch.

Section V—Electrical Materials, Standard Parts, Tests and Regulations

5-01. Silver shall be a silver-copper alloy containing not less than 92.5 per cent silver and the remainder copper.

5-02. Lead shall conform to the standard specifications of the American Society for Testing Materials, for "Pig Lead," serial designation B-29-23, Grade III, Common Lead.

5-03. Solder shall conform to the standard specifications of the American Society of Testing Materials for "Solder

Metal," serial designation B-22-31, "Class A, Grades Nos. 1 or 3," as indicated or required.

5-04. Copper.

(a) Wire for insulated electrical wires and cables shall conform to paragraph 4(b) United States Navy Department Specifications 15Clg titled "Specifications for Cables, Electric, Insulated," dated May 1, 1931.

(b) Bare Cable for grounding purposes shall consist of standard concentric-lay, stranded, untinned, soft-drawn copper cable in accordance with the standard specifications of the American Society for Testing Materials for "Bare Concentric Copper Cable, Hard, Medium-Hard, or Soft," serial designation B-8-27.

(c) Bus Bars.

(1) Bus bar copper shall have a purity of not less than ninety-nine and eighty-eight hundredths per cent (99.88%), as determined by electrolytic assay, and shall be of the quality commercially known as "Electrolytic Copper."

(2) The electrical conductivity shall not be less than ninety-seven per cent (97%) of the A. I. E. E. standard for annealed copper.

(3) Bars may be manufactured by either the rolled or drawn process and should be as hard and rigid as is consistent with the other requirements of this specification.

[fol. 224c] 5-04. (c)—(4) Bars shall be straight, of rectangular cross section with plane surfaces of uniform width and thickness with a tolerance (plus or minus) of 0.002 inch in thickness and 0.010 inch in width.

(5) The surfaces shall be smooth, free from flaws, scale, cracks, corrosion and burrs.

(6) The bars shall be capable of withstanding a cold bend in either direction in the plane of their lesser dimension to the following inside radii, without the development of cracks:

Bar Thickness	Bending Radius (Inside)
1/16"	1/16"
1/8"	1/8"
1/4"	5/16"
3/8"	9/16"
1/2"	3/4"

(7) The bars shall be protected against damage from ordinary handling and shipment, and bars shipped loose may be rejected.

5-05. Electrical Insulating Materials.

(a) The following insulating materials shall conform to the United States Navy Department Specifications 15 C 1 9, titled "Specifications for Cables, Electric, Insulated," dated May 1, 1931, paragraph designations as indicated:

(1) Varnished cambric insulation, paragraph 4 (d).
(2) Lubricating compound for varnished cambric insulation, paragraph 4 (e).
(3) Rubber filled tape, paragraph 4 (f).
(4) Asbestos insulation, paragraph 4 (g).
(5) Paraffined jute fillers for cables, paragraph 4 (h).
(6) Cotton thread, paragraph 4 (i).

[fol. 224d] 5-05. (a)-(7) Inner and outer cotton braids, paragraphs 4 (k), 1, 2, except that coding shall conform to N. E. L. A. standard coding for control cables.

(b) Rubber insulation shall be a compound equal to that manufactured by the "General Cable Corporation," containing not less than 30 per cent by weight of pure unused Hevea rubber, and meeting the following physical tests made in accordance with the standard procedure of the American Society for Testing Materials:

(1) Minimum initial tensile strength—1500 lbs.
(2) Minimum initial permanent set in 2-inch gauge length—5/16 inch.
(3) Minimum initial elongation at rupture, in 2-inch gauge length—9 inches.
(4) Initial specific gravity—1.75.
(5) Initial tensile and elongation requirements shall be met after 96 hours in the Oxygen Bomb at 158 degrees F, and 300 pounds per square inch pressure, or after 192 hours in the Geer over at 158 degrees F.
(6) The rubber compound shall have a minimum tensile strength of 1,000 pounds and a minimum elongation of rupture of 8.5 inches after 960 hours in the Geer Oven at 158 degrees F, or after 144 hours in the Geer Oven at 250 degrees F.
(7) Water absorption—A 6-inch sample of wire with carefully paraffined ends shall be weighed on a torsion

balance and then submerged in fresh water at a temperature of 68 degrees F. for a period of 24 hours. The increase in weight after submersion and removal of surface water shall not be more than 5 per cent of the weight before submersion, exclusive of the weight of the copper.

(c) Flame Proof Braid shall be of a closely woven yarn of at least 30/2 ply in size and finished with a flame retardant compound. The compound shall consist of a suitable high grade ing-edient and shall retain its united qualities during the life of the cable. The compound shall develop no injurious chemical reactions within itself or with any other component parts of the completed cables. It shall be of such a character that it will not drip from the completed [fol. 225] cable at any temperature up to 500 degrees centigrade.

5-05. (d) Rubber Insulating Tape shall be equal to grade "Alpha" as manufactured by the Johns-Manville, Inc., and shall conform to the tentative specifications of the American Society for Testing Materials, for "Rubber Insulating Tape," serial designation D-315-31T.

(e) Asbestos Tape shall conform to the tentative specifications of the American Society for Testing Materials, for "Asbestos Tape for Electrical Purposes," serial designation D-315-31T.

(f) Friction Tape shall be equal to grade "Jomanco" as manufactured by Johns-Manville, Inc., and shall conform to the standard specifications of the American Society for Testing Materials, for "Friction Tape for General Use for Electrical Purposes," serial designation D-69-28.

(g) Rubber Insulating Mats for use around electrical apparatus shall conform to the standard specifications of the American Society for Testing Materials, for "Rubber Matting for use around Electrical Apparatus or Circuits not exceeding 3000 volts to Ground," Serial designation D-178-24.

(h) Insulating Compound for lead cable splices and potheads, shall be of a high grade, nonabsorbent asphaltic compound of low carbon content and having high dielectric strength and low power factor and dielectric loss. It shall be dense and impervious to water, acids, or alkalies and entirely free from any element which might be injurious to

copper, brass, lead, iron, porcelain, rubber, paper or varnish cambric. It shall be highly adhesive and remain in permanent contact with the above materials without mutual action. The compound shall have a melting point of 158 degrees Fahrenheit, as determined by the cube method, a flash point of 560 degrees Fahrenheit, and an ignition point of 685 degrees Fahrenheit. At ordinary room temperatures and at 32 degrees Fahrenheit it shall not show cracked fissures or checks. It shall be similar and equal to Ozite "B" as manufactured by the General Cable Corporation.

(i) Insulating Paint for electrical purposes shall be similar and equal to the Sherwin-Williams "Ajax" No. 26.

(j) Asphalt Paint for electrical purposes shall be similar and equal to the "Ruberoid P. & B. Rapid Asphalt Paint," as manufactured by the Ruberoid Company.

5-06. (a) Switchboard Wire shall be not smaller than No. 12 A. W. G., single, solid, tinned, soft-drawn, copper conductor, insulated with 2 layers of 0.010 black varnished cambric tape, 30 mils felted asbestos, impregnated with [fol. 226] flame-proof and moisture-resistant compound, with outer covering of 20 mils of a closely woven cotton braid impregnated with flame-proof and moisture-resistant compound with a smooth finish. It shall be similar and equal to table "B" insulated wire as manufactured by the Rockbestos Products, Inc.

5-06. (b) Tests.

(1) Dialectric.—The insulated wire shall withstand 3000 volts for 5 minutes without failure. This test shall be made in conformity with the American Institute of Electrical Engineers procedure and between single conductor and metallic sheath.

(2) Bend.—The insulated wire shall be bent 180° around a mandrel 8 times the diameter of the finished wire, straightened and bent 180° in opposite direction, then straightened and subjected to 1500 volts for 5 minutes without failure.

(3) Flame.—The wire must not convey fire nor support combustion for more than 1 minute after 5-15-second applications of a standard test flame as approved by the contracting officer; the period between application of the test flame being 15 seconds.

5-07. (a) Control Wire shall be not smaller than No. 12 A. W. G., single, tinned stranded conductors, insulated with a 3/64-inch wall of heat-resistant rubber compound (par. 5-05(b)), 80 mils of felted asbestos, impregnated with flame-proof and moisture-resistant compound; and an outer covering of 20 mils of closely woven asbestos braid, thoroughly impregnated with flame-proof and moisture-resistant compound, and waxed. It shall be similar and equal to the product of the Rockbestos Products, Inc.

(b) Tests for this type of wire shall consist of the application of 5000 volts at 60 cycles for 5 minutes after being immersed in water for 12 hours, and 3000 volts at 60 cycles for 5 minutes when the wire is bent 90 degrees around a mandrel of the same diameter as the finished wire. Both tests shall be made while the wire is still immersed.

5-08. Lead Covered Power, Lighting and Control Cables.

(a) The lead covered cables specified below shall be used for all power, lighting and control circuits installed in conduit embedded in concrete. The cable shall be terminated in suitable cable terminators or junction boxes and connected to the proper terminals as shown on detail drawings.

[fol. 227] 5-08. (b) (1) The 440-volt power cables shall consist of the required number and sizes of conductors indicated in the cable tabulations and shall be designated by the symbol "CP" as shown on sheet 29/5. All conductors shall be concentric lay with standard stranding and individually tinned wires. Each conductor shall be insulated as follows: 30 per cent rubber insulation as specified in par. 5-05(b) above, the thickness conforming to the American Institute of Electrical Engineers standards for 1500 volts pressure, with 1 tape or braid color coded to identify individual conductors. The insulated conductors shall be cabled together with standard lay and paraffined jute filler over which shall be applied a rubber filled tape lapped ¼" with an outer sheath of lead containing 1 per cent antimony. The sheath shall be of uniform thickness, conforming to the table in paragraph 5-10.

(2) Electrical properties shall conform to the latest American Institute of Electrical Engineers standard for 1500-volt, 30 per cent rubber-insulated, lead-covered cable.

(c) (1) The 220-volt lighting cables shall conform in all respects to the 440-volt power cables. These cables are designated by the symbol "CL" and shall consist of the required number and size of conductors indicated on the cable tabulation sheet 29/5.

(2) Electrical properties shall conform to the latest American Institute of Electrical Engineers standards for 600 volt, 30 per cent rubber-insulated, lead-covered cable.

(d) (1) The 440-volt control cable shall consist of the required number of conductors indicated in the cable tabulations on drawing 29/5. If saving in costs will be obtained thereby, short lengths of multi-conductor cable with the next larger number of conductors required by the schedule may be furnished with the approval of the contracting officer. Each conductor shall consist of nineteen (19) strands of No. 22 A. W. G. tinned copper wire, insulated as follows: 6/64" wall of 30 per cent vulcanized rubber compound (5-05(b)) and one braid with National Electric Light Association standard color coding for control cables. The conductors shall be cabled together with a lay of 12 to 16 times the diameter of the cable conductors, with a paraffined jute [fol. 228] filler. Over the cable conductors shall be applied a rubber filled tape not less than .010" in thickness and lapped at least ¼". Over these taped conductors shall be a lead sheath of uniform thickness containing 1 per cent antimony. The thickness shall conform to paragraph 5-10 below. Prior to the application of the lead sheath, the cable shall be vacuum treated in order that it shall be practically free from moisture. These cables shall be subject to temporary or continuous immersion in river water and shall be guaranteed for this service.

(2) Electric properties shall conform to the latest American Institute of Electrical Engineers standard for 1500-volt rubber-insulated, lead-covered, control cable.

5-09. Power and control leads in power house.

~~(a)~~ Power leads shall conform to size and number of conductors indicated on wiring diagram 29/3 and schematic connections diagram 29/1. Power leads shall consist of generator leads, exciter and field leads and leads for pump motors and air compressor, and shall be insulated as follows:

Over each conductor shall be applied 30 mils of felted asbestos; 3 layers of .006 varnished cambric; 45 mils of felted absestos; with one cotton braid. The insulated conductors shall be cabled together with standard lay and paraffined jute fillers, over which shall be applied a rubber filled tape lapped ¼". An outer sheath of lead shall be applied and shall conform in thickness to table listed below in paragraph 5-10.

(b) Control leads shall be multi-conductor cable of the size and number of conductors as shown on the wiring diagram 29/3 and schematic connection diagram 29/1. The control leads are connected to solenoid valves for pumps, air whistle, pressure regulator and air compressor control. Each conductor shall consist of 19 strands of No. 22 A. W. G., tinned, soft-drawn copper wire, insulated as follows: 15 mils of felted asbestos; 3 layers of .006 varnished cambric; 15 mils of felted asbestos, with a cotton braid coded in accordance with N. E. L. A. standard coding. The insulated conductors shall be cabled together with standard lay and paraffined jute fillers, over which shall be applied a rubber filled tape lapped ¼". An outer sheath of lead shall be applied to conform in thickness to the table listed below in paragraph 5-10.

(c) Electrical properties shall conform to the latest American Institute of Electrical Engineers standards for 1500-volt, rubber-insulated, lead-covered, control cable.

[fol. 229] 5-10. Lead Sheath.—The sheath shall consist of virgin lead not less than ninety-nine and eighty-five one hundredths per cent (99.85%) pure, alloyed with one per cent (1%) of antimony and tightly formed about the core. The average thickness of the lead as determined by micrometer caliper measurement on one (1) specimen removed from each end of the cable length, shall not vary more than 10 per cent of the thickness specified in the following table:

Core- Diameter—	Inches	Sheath Thickness—	Inches
less than	1.050	0.078	(5/64)
1.051 to	1.500	0.094	(6/64)
1.501 to	2.000	0.109	(7/64)
2.001 to	3.000	0.125	(8/64)
more than	3.001	0.141	(9/64)

5-11. Unit weight and lengths.

(a) The unit weights given in the tabulations and drawing 29/1 are from catalog data and are subject to variation, depending on the particular make of cable.

(b) The length given for the various runs of cable are estimated lengths and shall be checked in the field by the contractor before installing the cable.

5-12. Power and Lighting Cables in Exposed Conduit.

(a) All power and lighting cables for use in exposed conduit on the service bridge shall be of single stranded conductor of the size specified, insulated with Rockbestos "Table E" insulation or equal.

(b) Tests on this type of insulated cable shall be made in accordance with the United States Navy Department Specification 15 c l g, paragraph 6(g).

5-13. Shipment.—All wire and cable shall be shipped on suitable reels, plainly marked to indicate the cable size, length, number and size of conductor, thickness and character of insulation and name of manufacturer.

5-14. Conduit.

(a) Fibre Conduit.

(1) All fibre conduit shall be made of a finely divided wood pulp or fibre, thoroughly impregnated with bituminous insulating compound to give walls of a hard, compact, homogeneous material with a nominal thickness of one-
[fol. 230] fourth inch (¼"). The duct shall not be affected by acids, alkalies or moisture and shall be free from all substances which might corrode or injure the lead sheath or rubber compound of a cable. The thickness of the walls shall not be more than 1/32 inch less nor 1/16 inch greater, at any point than the nominal thickness of ¼ inch. The circumference, including joints, shall not vary at any point more than 1/16 inch from a true circle at a temperature of 65° C. (150° F.) or less. Each piece of duct shall be capable of passing a mandrel 36 inches long and of a cross-section ⅛ inches less than the nominal diameter of the duct. A 5-foot straight edge laid lengthwise on the concave side of a 5-foot section of duct should not show an off-set of more than ¼ inch. The duct material shall not

puncture when an alternating current potential of not less than 25 or more than 100 cycles per second and approximately as closely as possible to a sine wave is applied between the inner and outer surface for a period of at least 5 minutes. Previous to the application of this test, the duct to be tested shall be immersed in water for not more than 48 or less than 24 hours. The voltage to be applied for duct with ¼ inch nominal thickness of wall shall be 15,000.

5-14. (a)-(2) Sleeve type joints shall be used. Each piece of duct shall have a machine-cut taper on each end. The taper shall be 4 degrees on the diameter. A sleeve shall be furnished for each length of conduit, of the same material as specified for the duct, machine cut to an internal taper at each end, the taper being the same as specified for the duct. The minimum thickness of the sleeve shall be not less than ½ of the nominal thickness of the duct. The tapers on the duct and sleeve shall be so cut that when the joint is made up the ends of the duct will neither touch or separate by more than ½ inch.

(b) Rigid Metal Conduit shall be hot dipped galvanized, similar and equal to the General Electric Company's "Greenfielduct."

(c) Flexible Metal (Galvanized) conduit shall be of the concave, double-strip type. It shall consist of 2 strips of galvanized steel, spirally wound on each other, with a water-[fol. 231] proof gasket provided between the strips. It shall be fabricated and finished so as to present a smooth, even surface within the conduit. All conduit used shall be approved by the National Board of Fire Underwriters.

5-15. Conduit Fittings or Bodies for metal conduit shall be cadmium coated, copper bearing, malleable iron casting containing not less than 3 per cent copper, and shall be similar and equal to the standard product of the Killark Electric Manufacturing Company.

5-16. Asbestos Sheet.—Asbestos board shall be Johns-Manville "Transite" Grade A, standard finish or equal. Asbestos Ebony for switchboard panels shall be of Johns-Manville manufacture, or equal, with a deep black, lacquered switchboard finish.

5-17. Cable Supports of the flexible band type, similar and equal to "No. 224" as manufactured by the G. & W.

Electric Specialty Co., shall be provided for supporting the lead covered cables in the manhole risers on the land and river walls. Embedded channels, which have been drilled and topped to suit these cable supports and the necessary stud bolts, are in place.

5-18. Cable Hangers, similar and equal to the standard product of the Minerallic Electric Company, shall be provided and mounted as indicated on the detail drawings.

5-19. Cable Terminators for control and power cables shall be similar and equal to the standard products of the G. & W. Elec. Specialty Company, except as otherwise specified on the detail drawings. They shall be of the proper voltage and ampere rating and type for the respective circuits as called for on drawings.

5-20. Knife Switches.—Double-throw and single-throw knife switches shall be similar and equal to the type "A. L." switches of the Westinghouse Electric & Manufacturing Company. They shall be of the Ampere rating and voltage as called for on the detail drawings and specifications.

5-21. Safety Switches.

(a) Double-throw, nonfusible safety switches shall be similar and equal to the type T-4003 switch of the Trumbull Electric Company's manufacture.

(b) Single-throw, fusible safety switches shall be as specified on the detail drawings and specifications. They shall be of the rating and voltage as called for on the detail drawings and specifications.

[fol. 232] 5-22. Oil Circuit Breakers shall be three-pole, single-throw, 4500-volt, 400-ampere, manually operated, with two trip coils with inverse time limit overload features. The interrupting capacity of this breaker shall be at least 15,000 amperes at 600 volts, based on the standard 2-O. C.D. duty cycle as defined by the National Electrical Manufacturers Association apparatus standards. These breakers shall be similar and equal to the standard product of the Westinghouse Electric and Manufacturing Company's type "F-11."

5-23. Oil for Oil Circuit Breakers shall be similar and equal to Westinghouse Electric and Manufacturing Company's "WEMCO" "C" oil.

5-24. Manually Operated Air Circuit Breakers shall be Westinghouse type "AB De-ion" or approved equal, of the rating indicated on the detail drawings or otherwise specified.

5-25. Fuses shall be of the ampere rating and voltage indicated on the detail drawings and shall be of the Russman Manufacturing Company's Superlag renewable type, or equal, and shall conform to the latest rules of the National Electric Code.

5-26. Magnetic Contactors.

(a) All contactors shall be of the shunt type, equal to the standard product of the Westinghouse Electric and Manufacturing Co. They shall be liberally proportioned for the maximum currents and voltages under which they will operate. They shall be quick, positive and quiet in operation and shall be so designed that they will open promptly without any tendency to stick in the closed position due to residual magnetism, and there shall be no tendency to weld when closing. The contact tips shall be of copper, silver faced, and shall be easily accessible and removable for replacement. They shall close with a rolling and wiping motion and shall be so designed that they will close and complete the wiping action on 85 per cent of rated voltage of the coil. Effective magnetic blow-out coils and arc-chutes shall be provided to extinguish the arc formed between the contact tips. Means shall be provided to prevent bolts and other parts from becoming loose. All ferrous parts shall be heavily galvanized, sherardized, or cadmium coated to prevent rust. All pins and fittings shall be made of bronze.

(b) Coils shall be thoroughly insulated with a moisture-proof insulating varnish.

5-27. Switchboard Instruments.

(a) The following instruments shall be similar or equal to the standard product of the Westinghouse Electric and Manufacturing Company:

[fol. 233] 5-27. (a)-(1) Indicating meters shall be type "W" projection type of the duty indicated on the drawings, and be direct reading.

(2) Intergrating meters shall be type "O.B."

(3) Overload relays, type "C.O."

(4) Reverse phase relay, type "C.P."

(5) Control relay, type "M".

(b) Graphic watt meter shall be of the flush type; range 0-600 K. W.; direct reading; 3 inch per hour chart speed; spring drive; similar and equal to the Model A.W. as manufactured by the Esterline-Angus Company.

5-28. Voltage Regulator shall be of the rocking contact type similar and equal to the standard product of the Allis-Chalmers Manufacturing Company.

5-29. Instrument Transformers shall conform to the requirements of the duty of the circuits and wiring diagrams, and shall be similar and equal to the standard product of the Westinghouse Electric and Manufacturing Company. Current transformers shall safely withstand the maximum short circuit current which may be encountered on the system covered by these plans and specifications.

5-30. Junction Boxes for 220 volt lighting circuits shall be similar and equal to type "K" junction box as manufactured by the G. & W. Electric Specialty Company. All boxes shall be drilled at the factory for the proper fit around the lead-covered cables, with which they are to be used.

5-31. Distribution Transformers shall be similar or equal to General Electric Company's type "M" design. They shall be air cooled, single phase and rated for continuous duty. Their rating shall be as indicated on the drawings or otherwise specified.

5-32. Composition Insulators for Crane Contact Rails shall be similar and equal to the Electric Service Supplies Company's "Keystone Giant" strain insulators.

5-33. Rail Bonds shall be of stranded copper cable with a current carrying capacity equal to, or greater than that of the rail tap to the feeder. All rail bonds and rail taps shall be welded to the conductor rail.

5-34. Terminal Blocks shall be as shown on detail draw- [fol. 234] ings and shall be similar and equal to Standard Product of the Westinghouse Electric and Manufacturing Company.

5-35. Control Switches shall be similar and equal to the standard product of the company indicated on sheet 29/7. They shall be substantially constructed with the drum development and operating features as called for and shall conform as nearly as possible to the construction as shown on sheet 29/7. All insulating materials for cam and finger blocks shall be nonhygroscopic. Each master switch shall be provided with a strong spring for holding the switch in the various positions. The operating handle for the switch shall be of a pistol grip and shall be of black molded bakelite with a smooth polished finish. The handle shall be arranged to fit over the cam shaft of the control switch and held in place with a screw extending entirely through the shaft. The protruding end of the screw shall be uppermost and arranged to act as a pointer for indicting the switch throw. The switches shall be provided with nameplates as shown on sheet 29/7. All steel parts shall be of stainless steel. All cast ferrous parts shall be galvanized, sherardized or cadmium coated. Each terminal shall be suitably marked with its wiring diagram number stamped on a small horn fiber tag. The tag shall be either attached to the switch by means of a slot adjacent to the terminal post or bolted to the terminal post.

5-36. Electrical Materials, Workmanship, Equipment and Tests shall conform in every way to the latest edition of the National Electric Safety Code and the National Electric Code and to the latest standardization rules of the American Society of Electrical Engineers and the National Electrical Manufacturers Association, except as otherwise specified. The electrical equipment will be subjected to exceptionally severe conditions as regards fog and moisture, changes in temperature, etc., tending to produce condensation upon it. All insulation shall, therefore, be selected for this condition, and all other parts of the equipment shall be so designed that they will not be injuriously affected by exposure to the above conditions or extremes of atmospheric temperatures liable to be encountered in the locality specified.

Section VI—Miscellaneous Materials

6-01. Rubber Seals for the roller-gates and stoney valves shall be of the sizes and types indicated or required and shall be in conformity with the standard specifications of

the American Society for Testing Materials, for "Rubber pump valves," serial designation D 151-23, "Class 300."

6-02. Asbestos.

(a) Sheets shall be similar and equal to the standard mill-[fol. 235] board produced by Crane Co.

6-02. (b) Gaskets 1/32 to 1/8-inch thick, for air, oil or water lines of less than 125 pounds per square inch pressure, shall be similar and equal to type "CC" sheet packing as manufactured by Crane Company. Gaskets for engine exhaust pipe or high pressure oil and water lines shall be similar and equal to "Cranite" as manufactured by Crane Company.

6-03. Cork Isolation for machinery foundations shall be similar and equal to "Armstrong's Cork Machinery Isolation, light density."

6-04. Fiber Composition for gaskets shall be of the dimensions indicated or required and similar and equal to the "Klingert" gasket No. 103 as manufactured by the Best Manufacturing Company.

6-05. Vitrified Clay Pipe shall be of standard, commercial sizes as indicated or required, conforming to the standard specifications of the American Society for Testing Materials, for "Clay Sewer Pipe," serial designation C13-24.

6-06. Partition Tile shall be of standard commercial sizes and types as indicated or required, conforming to the standard specifications of the American Society for Testing Materials, for "Structural Clay Load-Bearing Wall Tile," serial designation C34-31.

6-07. Clay Flue Lining shall be of standard commercial sizes and type as indicated or required. It shall be of the highest quality, hard burned fire clay, perfectly sound, with regular surfaces and square edges. The shape and dimension of each piece shall be true and uniform.

6-08. Glass.

(a) Sheet glass shall be of the highest grade, double strength, flat drawn, "A" quality. Unless otherwise specified or required it shall be perfectly clear and without flaws or irregularities.

(b) Plate glass shall be of type "A" glazing quality, polished, conforming to the Federal Specification DD-G-451.

6-09. Paint for Concrete Surfaces.

(a) Walls and ceiling paint shall be similar and equal to "Lyt-All Finish" as manufactured by Pratt and Lambert, Inc., St. Louis, Mo., for walls.

(b) Floor paint shall be similar and equal to standard [fol. 236] "Valspar Floor Enamel."

6-10. Packing.

(a) Stem and Plunger packing shall be similar and equal to Types 401 and 859 as manufactured by the John Crane Co.

(b) Rawhide, square brodded packing for pistons, shall be made of selected hides and processed similar and equal to "Mables Rawhide" packing for cold liquids.

(c) Oak Leather packing for control valves and Stoney valve plungers shall be formed on steel dies to the exact shape and dimensions indicated on the drawings. The leather shall be high grade, dense, hard, oak-tanned sole leather. Any leather packing which is found to have become softened in use with either water or oil, within 1 year after installation, shall be promptly replaced by the contractor without cost to the United States. No substitutes of any nature will be accepted for the above oak-tanned sole-leather.

(d) Ring packing, unless otherwise required, shall be similar and equal to the "Oiline" packing as manufactured by the Garlock Packing Company. It shall be of the types and sizes indicated on the drawings.

6-11. Roofing Tile for the power house and operating houses shall be red shingle tile similar and equal to the "Imperial Provincial" tiles manufactured by the Ludowice-Celadon Company.

6-12. Roofing Felt for the power house and operating houses shall weigh not less than 40 pounds per 100 square feet. It shall be approved asphaltic, impregnated felt laid in hot liquid bituminous material applied directly to the concrete deck.

Section VII—Mitering Lock Gates

7-01. General.—Lock "B" shall be provided with a lower gate 41 feet high and an upper gate 23 feet high. The gates shall be constructed, assembled and installed as indicated on Sheets 21/1B to 21/4B, inclusive, 21/6B, 21/7B and 21/9B. Alterations to the existing upper gate of Lock "A" shall be made as indicated on Sheets 21/5B and 21/8B, and as described in Section XX.

7-02. Materials and Workmanship.

(a) Metal Work shall be in conformity with the requirements of Section IV and as further specified below.

[fol. 237] 7-02. (b) Rivet Holes shall be subpunched or drilled at least ⅛ inch smaller than the nominal size of the rivet. Holes shall be reamed to a diameter not more than 1/16 inch larger than the nominal diameter. Holes for field rivets shall be reamed after the gate has been erected and bolted together in the field, but may be reamed in the shop if the entire gate is assembled. All reamed holes shall be perfectly smooth, showing that the reamers have touched the entire circumference. The outside burrs on reamed holes shall be removed to the extent of making a 1/16 inch fillet. Where reaming is not required, the diameter of the punch shall be not more than 1/16 inch greater than the diameter of the rivet; nor will the diameter of the die be more than ⅛ inch greater than the diameter of the punch. Holes for fender bolts need not be subpunched nor reamed. Poor matching of holes will be cause for rejection. Punching shall be accurately done. Drifting to enlarge unfair holes will not be allowed. For slight mismatching, reaming to a larger diameter for the next standard size of rivet may be allowed.

(c) Eye Bars shall be straight and true to size and shall be free from twists and folds in the neck or head or any other defect. Heads shall be made by upsetting, rolling and forging. Welding will not be allowed. The form of heads shall be determined by the dies in use at the works where the eye bars are made, subject to the approval of the contracting officer. The manufacturer shall guarantee the bars to break in the body when tested to rupture, and if required 2 bars shall be tested to rupture. The thickness of the head and neck shall not vary more than 1/16 inch from that specified.

(d) Boring Eye Bars.—Before boring, each eye bar shall be properly annealed and carefully straightened. Pinholes shall be in the center line of bars and in the center of heads.

(e) Turnbuckles for the various eye bars shall be of the best quality forged steel. They shall be of uniform strength and section, and shall have symmetry of finish. They shall be of standard dimensions.

(f) Pins shall be accurately turned to gages, straight and smooth, and entirely free from flaws.

(g) Pilot Nuts.—The contractor shall furnish such pilot and driving nuts as may be necessary for the proper erection of the work.

(h) Bronze Bushings.—Shall be made of phosphor bronze, shall have a driving fit, and shall be smooth and flush with the outside surfaces of the members in which they are placed.

(i) Pintles and Pintle Castings.—The tops of pintles and [fol. 238] the phosphor bronze pintle seats shall be finished truly hemispherical and then polished. The bottom of the pintle shall be faced, and the body turned to accurately fit the lower pintle casting. The pintle and pintle seats must be so carefully made that they will be interchangeable.

7-02. (j) Drainage Holes shall be provided in horizontal girders as shown on the drawing.

(k) Grease pipe.—There shall be provided a one-half-inch brass pipe leading from the top of the gates to the pintles for supplying grease to the pintles by means of a grease gun, as shown on sheets 21/3B and 21/7B.

(l) Welding shall be done wherever indicated on the drawings or otherwise deemed necessary by the contracting officer, before and while testing the gates for water-tightness.

7-03. Handrailing.—The gate shall be provided with handrailings as indicated on the drawings. All railing shall be of standard steel pipe, with malleable fittings of ball pattern.

7-04. Timber Work.—The gate shall be provided with timber fenders and water seals as indicated on the drawing.

All timber work shall be in conformity with the requirements of Section II.

7-05. Erection.

(a) Shop Erection.—In order to detect any errors in the templates, the contractor shall erect at his works, without charge, one complete leaf of each gate. The leaf shall be carefully assembled, bolted together, and the field and bolt holes reamed. Any errors in the templates or elsewhere, found during the erection, shall be immediately corrected in each leaf. All pieces in each leaf assembled at the shop shall be clearly matchmarked, so as to facilitate erection in the field.

(b) Field Erection Plans.—Before beginning the field erection, the contractor shall submit for approval of the contracting officer, a detailed description with sketches in duplicate showing the method of erection proposed.

(c) Precautions during Erection.—In both shop and field erection the utmost care shall be taken to get the skeleton into correct alignment before any rivets are driven. In the field erection the separate parts shall be tightly bolted together, and the rivet and bolt holes shall then be reamed to their full size if not reamed and matchmarked in the shop. All necessary precautions shall be taken in driving the [fol. 239] rivets to avoid the distortion of the gate as a whole and of any of its component parts. Rivets shall be tight when hammered. Where necessary they shall be calked to make them watertight but shall not be recupped. In the course of erection, all timbers that are used to take direct bearing stresses shall be protected by suitable steel plates to distribute the load over the wood area, in order that settlement will not take place. The sill beams shall be erected in the recess provided and after final erection of the gate, shall be adjusted to provide uniform bearing along the entire length. After final adjustment they shall be firmly grouted in place.

7-06. Trial Operation.—After erection and before final acceptance, the gates shall be operated by moving the leaves back and forth through their entire travel, both with cofferdam unwatered and flooded, to give the various conditions occurring in operation. Necessary adjustments shall be made at the expense of the contractor. The workmanship

in the gates must be such that, when the leaves are closed, they will form a practically water-tight barrier across the lock under maximum loads, and shall be tested for this condition. There shall be no material leakage at the miter sills or quoin.

7-07. Painting shall be in conformity with the requirements of paragraphs 4-45 and 4-46. They shall receive 1 shop coat and 2 field coats of bituminous priming solution and 1 field coat of hot bituminous enamel. The handrailing shall be painted with aluminum paint as specified in paragraph 4-46.

7-08. Payment for the complete gates and sills, constructed, installed in place, and painted, will be made at the contract unit prices for the various materials and items used, in accordance with the provisions of paragraph 4-47. Payment for the brass grease pipes will be made at the unit price bid for "Bronze."

Section VIII—Lock-Gate Operating Machinery

8-01. General.—The contractor shall furnish and install the gate-operating machinery for all 4 leaves of the gates for Lock "B."

8-02. Gate Jack Cylinders.—The jack cylinders shall be bored straight and true to line and diameter, leaving a smooth working surface throughout the length of the cylinder.

8-03. Packing.—The flanged joints of cylinders shall be packed with oil-proof sheet packing 3/32-inch thick, and the stuffing boxes with piston rod packing as specified in paragraph 6-10(d) and as indicated on sheet 22/5B.

8-04. Pistons.—The pistons shall be assembled and made [fol. 240] to fit the cylinders after boring.

8-05. Assembling.—Before shipment the gate jack cylinders, pistons, piston rods, heads and stuffing box glands shall be assembled as indicated on sheets 22/1B and 2B.

8-06. Double four-way Valves.—Valves for operating the mitering gates shall be furnished and installed by the contractor at the locations indicated on sheets 22/1B and 2B.

8-07. Tests.—After the piping has been connected, the operating machinery shall be tested under a hydraulic pres-

sure of 500 pounds per square inch. Any leaks which occur will require replacement of the faulty parts. The contractor shall be responsible for the successful operation of all the machinery at the working pressure of 350 pounds per square inch. All pressure tests shall be made with hydraulic oil to be furnished by the United States. No water shall be used in the tests under any conditions and the piping shall be absolutely free from all scale, rust or other foreign substances.

8-08. Payment for the four gate-operating machines will be made at the contract lump-sum price for "Operating Machines—Lock Gates." The price bid shall cover all necessary material and work for furnishing, installing, connecting complete, testing and painting as indicated on the drawings or required in the specifications. Estimate for 60 per cent of the contract price will be made when all the material has been delivered and accepted at the site of the work provided such material be stored and protected from corrosion in a manner satisfactory to the contracting officer. The remaining 40 per cent will be estimated when all the material has been installed, connected complete, tested and accepted. If any material stored and partly paid for be not kept protected in a manner satisfactory to the contracting officer, no further payment on this item will be made and the material will be kept protected by the contracting officer at the expense of the contractor.

Section IX—Stoney Gate Valves

9-01. General.—The contractor shall furnish, completely install and connect the upper and lower stoney gate valves in the land wall of Lock "B."

9-02. Valve Blades.—Each valve blade is connected near its center to a vertical stem and is operated by two hydraulic jacks with stationary plungers. The valve guides in the recess (see sheet 24/3B) provide for a play of only ¼ inch upstream and a lateral play of only ⅛ inch either way, making a total lateral play of ¼ inch. All parts and fittings, as well as all structural material entering into the construction of the valve, and any of its accessories must [fol. 241] be carefully made and fitted together, so that when the valve is actually assembled in the valve chamber, there will be no interference due to faulty alignment of any of the

parts attached to the valve blade or any warping or twisting of the valve during the construction of the same which would in any way hamper or cripple perfect operation. All the material entering into the construction of the valves must be straight and without wind. The valves when constructed and delivered shall not be out of wind more than ⅛ inch, the amount of wind to be the distance between one corner of the valve and the plane of the other three corners. The outside faces of the side rollers must be equidistant from the vertical center line of the valve and be within ⅛ inch of exact dimensions shown on the drawing, from face to face of rollers. Imperfections or distances in excess of the above will be cause for rejection. In view of the above clearances one valve blade shall be assembled and erected complete in the shop without additional charge.

9-03. Main Frame.—All vertical and horizontal members shall be straight-flanged, 21-inch by 8¼ inch I-beams weighing 62 pounds per linear foot, square cut, neatly fitted and aligned to conform with drawing dimensions. All members shall be assembled complete with all plates, skin sheet, stiffner and connection angles, diagonals and reinforcing plates in a frame or gig to prevent warping before riveting. All parts shall then be checked for accuracy of dimension, be parallel, square at intersections and allowance made for planing. All sharp exposed edges shall be removed and all holes reamed to match accurately. Flame cut plates or members shall be tool dressed to line, with edges square to surface where required. All skin plate seams shall be watertight.

9-04. Head Frame.—The 12-inch standard channels shall be framed into the upper ends of the 2 vertical I-beams as shown, shall be square, and in line with all plates, diaphragms, diagonals, and cable bracket sole plates.

9-05. Nickel Steel Lower Seal Strip.—In addition to the lower 21-inch I-beam, there shall be a ½-inch reinforcing web plate, an 8-inch x 8-inch x ¾-inch angle, and a rolled or forged nickel-steel plate, which shall be machine fitted and matched with the planed edge of the 5/8-inch skin-plate. Structural steel reinforcing webs of ⅞-inch plate shall be cut to fit between flanges of the 21-inch I-beam and shall support the ½-inch reinforcing plates and be electric welded to these members on both sides of the reinforcing webs with a full continuous bead.

9-06.-Side Seal Plates, indicated on sheet 24/9B, shall be made of chrome-nickel steel.

9-07. Upper Seal Casting (sheet 24/14B) shall conform [fol. 242] to all details, match accurately and align parallel with the finished edge of the nickel steel, lower seal strip. It shall be true and square with the planed surface of the side seal reinforcing plate. A temporary set up of all parts adjoining with the upper, lower and side seals shall be made in the shop and all adjustments made in the bolted stage, in order to conform accurately to drawing dimensions and tolerances and have the final approval of the inspector before any riveting is done.

9-08. Holes for Fitting up Bolts and Rivets.—All members shall be subpunched and reamed to match in assembly, or drilled when assembled to insure matching of fixed and removable parts.

9-09. Rivets and Holes.—Rivet holes shall be subpunched and match reamed or drilled 1/16 inch larger than nominal size of rivet. Rivets shall be full size, all heads concentric with shank, unburned, and water-tight after being driven.

9-10. Bolts and Holes.—(a) All bolt holes shall be drilled to accurately match all parts. All sharp edges and burrs shall be removed from all holes. Holes in clamping channel shall match the slotted holes in the side seal plates. Drilled holes through skin and reinforcing plates for 7/8-inch turned nickel steel bolts shall be 1/16 inch larger than the bolt.

(b) The bolts for attaching the valve stem connection casting to the valve blade shall be turned and have a drive fit in the holes which are to be spot finished for the heads and nuts, and after being pulled up tight, shall have the nuts locked by peening. Nuts and threads shall be machine cut, well formed, full, and shall fit tight.

9-11. Counter Sunk Rivets.—(a) The countersink for these rivets shall be extra deep, and the rivets shall be full in the 12-inch by 5/8-inch reinforcing plate where the side seals come on the upstream side of the blade and in the 18-inch by 9/16-inch through plate on the downstream side where the track plates come, in order to allow for planing parallel. The members shall be initially true enough to be brought into alignment by making a cut not over 1/16-inch deep. All members shall be fully riveted before planing.

(b) In view of the limits of the side seal contacts, and the clearances shown by the large scale detail assembly, extra care shall be exercised to insure accuracy of alignment, especially with reference to the side seals and downstream track.

9-12. Open Holes.—All open holes for valve stem, drains and vents in webs of beams shall be bored and the sharp edges removed.

[fol. 243] 9-13. Roller Track on Valve and on Fixed Metal in Walls.—(Sheets 24/2B, 3B, 4B, 11B and 14B). The seat and roller faces of the track must be accurately planed to make the faces parallel to each other and perfectly straight. The roller face dimension must be exact throughout.

9-14. Roller Guide Bars.—(Pieces Nos. 1 and 2, sheet 24/12B). Roller guide bars shall be made of chrome-vanadium steel. Each bar shall be made from a single length of flat plate which shall be straight and without wind. The faces and edges must be planed true and parallel. The pin holes for the rollers and the bolt holes for the separators must be drilled perpendicular to the planed faces of the guide bars, so that when the rollers and separators are in place and the guide bars are bolted tightly together they will be perfectly true and will not bind the ends of the rollers against the bar, nor will there be any binding of the roller pintles in the guide bar holes. Each roller must have the specified amount of clearance both at the ends and around the pintles, and be free to move with axis perpendicular to the plane of the guide bar at all times. The bars shall be drilled in pairs bolted together, and match-marked so that the same pairs will be used together when the roller train is finally assembled.

9-15. Separators.—(Pieces Nos. 3, 4 and 5, sheet 24/12B). The separators shall be carefully made and the ends finished parallel and to exact dimensions, as shown on the drawing. The depths of the relief on the sides of the castings must be exact also to prevent interference. The holes for bolts must be accurately bored and be perpendicular to the end faces.

9-16. Rollers.—(Piece No. 6, sheet 24/12B). The rollers shall be made of chrome-vanadium steel. They shall be forged from large-size ingots or blooms, and the greatest

care exercised at all stages of the manufacture to insure freedom from flaws or defects in finish. The curved surfaces of the rollers must be accurately machined, hardened, tempered and ground to a smooth finish and accurate to gauge. Accuracy in all dimensions will be required. The rollers shall be perfectly straight and everywhere of uniform diameter so that if rolled on a true plane surface each roller will remain in contact throughout its length of travel. A variation in the diameter of a roller along its axis exceeding the dimensions shown on the drawings of more than .002 of an inch will be deemed sufficient cause for rejection.

9-17. Stoney Gate Valve Cylinders.—The cylinders for the Stoney gate valve jacks shall be made of open hearth, seamless steel pipe as specified in paragraph 4-26(b) and shown on sheet 24/6B. The inside surface of the cylinders shall be straightened sufficiently to clear the plungers. The ends shall be formed to provide sufficient metal to permit [fol. 244] machining full threads of the dimensions shown on the drawings.

9-18. Stoney Gate Valve Plungers and Plunger Bases.—The plungers and bases shall be made of cast iron and to dimensions indicated on the drawings. The plungers shall be finished straight and true to line and diameter, leaving a smooth working surface throughout their entire length. The plunger bases shall be fitted to the plungers in the shop so as to provide ample clearance in the square tapered hole to provide for a slight working alignment of the plungers with the cross arms and guides when in service as shown. Each matched plunger and base are to be match-marked.

9-19. Coltrol Valves.

(a) Three-way valves shall be made and assembled in conformity with details indicated on sheets 24/18B, 19B and 20B.

(b) The 3-way Automatic Valves and Linkages shall be made and assembled in conformity with details indicated on sheets 24/1B, 15B, 16B and 23B.

(c) All materials and workmanship shall be such that when tested at 500 pounds per square inch pressure with hydraulic-jack oil, the valves will show no leakage at plungers, gaskets or parts. Valves showing leakage will not be accepted.

9-20. Tests.—After the valve blades have been installed they shall be raised and lowered a sufficient number of times to assure that the specified clearances have been provided and that the control devices and seals function properly.

9-21. Payment for the two Stoney gate valves will be made at contract lump-sum price for "Stoney Gate Valves —Complete." The price bid shall cover all necessary material and work for furnishing, installing, connecting complete, testing and painting as indicated on the drawings or required in the specifications. Estimate for 60 per cent of the contract price will be made when all the material has been delivered and accepted at the site of the work provided such material be stored and protected from corrosion in a manner satisfactory to the contracting officer. The remaining 40 per cent will be estimated when all the material has been installed, connected complete, tested and accepted. If any material stored and partly paid for be not kept protected in a manner satisfactory to the contracting officer, no further payment on this item will be made and the material will be kept protected by the contracting officer at the expense of the contractor.

[fol. 245] Section X—Piping

10-01. (a) General.—The contractor shall furnish and install all piping for oil pressure and return lines, gas, gasoline, and water supply lines as indicated on the drawings and specified below, complete with all fittings, valves and supporting brackets.

(b) Oil Pressure and Return Lines, necessary for hydraulic operation of the miter gates and stoney gate valves for Lock "B". The lines shall be properly connected to the existing piping installed under a previous contract for Lock "A" and to the operating machinery on the lock walls and in the power house. (See paragraph 12-11.) All piping for the oil pressure system located on the lock walls, unless indicated otherwise, shall be made up with hydraulic recessed couplings, except that flanged couplings shall be inserted at approximately 100-foot intervals.

(c) Gas-Supply Line across Lock "B".

(d) Gasoline-Supply Line from the land wall across both locks to the storage tank in Pier No. 1.

(e) Water-Supply Line from the land wall across both locks to the power house.

(f) The water and gasoline supply lines shall be installed across Lock "A" at the time this lock is unwatered for the alterations at the upper gate.

10-02. Supports of concrete and cast iron shall be provided as indicated on the drawings or otherwise required.

10-03. Materials, Sizes and Types of the various pipe and other metal work, shall be as indicated on the drawings and in conformity with the requirements under Section IV.

10-04. Tests.—After the piping has been installed but before painting, the oil pressure lines shall be tested under a hydraulic pressure of 500 pounds per square inch. All other lines shall be tested under a pressure of 125 pounds per square inch. Any leaks which occur under these pressures, excluding those which may occur in the piping installed under previous contracts, shall be repaired to the satisfaction of the contracting officer. All oil line pressure tests shall be made with hydraulic oil to be furnished by the United States. The air line pressure tests shall be made with air. The gas and gasoline line tests shall be made with air. The water line tests shall be made with water. Except for the water lines, no water shall be used in these tests under any conditions.

[fol. 246] 10-05.—Painting.—All piping and other metal work of the complete system shall be painted with red-lead paint as specified under Section IV.

10-06.—Payment for all piping specified under this section will be made at the contract lump-sum price bid for "Pipe—For hydraulic operation system and water, gas, gasoline and oil supply lines." The price bid shall cover all necessary material and work for furnishing, installing, connecting complete, testing and painting as indicated on the drawings or required in the specifications, including all valves, fittings and supports but excluding all supports and the piping inside the power house. Estimate for 60 per cent of the contract price will be made when all the material has been delivered and accepted at the site of the work provided such material be stored and protected from corrosion in a manner satisfactory to the contracting officer. The remaining 40 per cent will be estimated when all the

material has been installed and connected complete, tested and accepted. If any material stored and partly paid for be not kept protected in a manner satisfactory to the contracting officer, no further payment on this item will be made and the material will be kept protected by the contracting officer at the expense of the contractor.

Section XI—Power House

11-01. General.—The power house shall be constructed on the river wall of the locks as indicated on the drawings and detailed on sheets 70/1 to 12, inclusive. All concrete except for the reef base shall be Class "A". All requirements under Sections III, IV and VI shall apply wherever applicable.

11-02. Walls.—The walls shall be erected over keyways provided in the top of the lock wall. Immediately before the placing of concrete, these keyways shall be given a paint coat of an approved asphaltic material to prevent bonding. The keyways at each end shall be provided with an approved asphaltic expansion joint filler 1 inch thick on the inner sides. The forms for the walls shall be lined with sheets of pressed wood to insure smooth, regular surfaces. (See paragraph 3-16.)

11-03. Interior Partitions shall be of lead-bearing hollow tile as specified in paragraph 6-06. The bonding mortar shall be composed of 1 part cement to ½ part lime putty to 3 parts sand.

11-04. Chimney.—The chimney shall be lined from clean-out door at the base to the top with square, fire clay flue linings of sizes indicated on the drawings. The joints shall be well cemented and struck smooth inside. The thimbles, cast iron door frames, and door for clean-out, shall be fur-
[fol. 247] nished and set in place before chimney is poured.

11-05. Roof.—(a) The base of the roof shall be of sawdust concrete as specified in paragraph 3-21. It shall be supported by a frame work of steel trusses, purlins, rafters and corrugated metal arches, as indicated on the drawings. The roof covering and fittings shall be of red shingle tile as specified in paragraph 6-11. The shingles shall be laid on an approved asphalt roofing felt as specified in paragraph 6-12. All flashing as indicated on the drawings or

otherwise required shall be of No. 20 gage, cold-rolled copper.

(b) Each tile shall be secured to the concrete with 2-inch extra hard noncorrosive nails. All vertical lines shall be parallel and at right angles to the eaves. Where pipes pass through the roof, the tile shall be ground for the pipe openings. The tile that verge along the hips shall be cut to fit close against the hip boards and be made water-tight with Hetzel's elastic roof cement or equal. Each piece of hip and ridge tile shall be nailed to the hip and ridge boards and cemented where they lap. Each tile shall be perfect and the finished roof shall be water-tight.

11-06. Gutters.—All gutters, including the connections to the cast iron downspouts, shall be constructed as shown on the drawings, and shall be made of No. 20 B. & S. gage, cold-rolled copper. All seams shall be made with a single-lock seal, sweat soldered. Hooded expansion joints shall be provdided at the high points in the gutters. The gutter shall be flashed back onto the concrete base for a distance of at least 6 inches from the ends of the shingles, and into the channel in the top of the wall. All flashing shall be fixed in place with metal wedges. The flashing in the channel shall be sealed in with an asphaltic compound, poured hot.

11-07. Downspouts.—All downspouts shall be of 3-inch and 4-inch cast-iron soil pipe. The gutter connections shall project into the bell end of the pipe and the joint caulked with oakum and sealed with bituminous cement. They shall be provided with curved fittings, anchored to the walls and connected to outlets as indicated on drawings.

11-08. Metal Doors and Trim.—The doors, frames and hollow metal trim shall be constructed as indicated on the drawings and shall be of a standard pattern similar and equal to the manufacture of the Lupton-Truscon Company. The doors shall have tubular stiles and rails of No. 14 U. S. Standard gage steel with No. 14 U. S. Standard gage steel panels in the lower portion and glazed steel sash in the upper portion. The frames shall be of No. 12 gage steel securely anchored to the masonry and reinforced at the hinge points as indicated. Each door shall be fitted with [fol. 248] brass hinges, cylinder locks and knob latches as specified in paragraph 4-31. The hollow metal trim shall be

of No. 18 gage metal and attached with screws and clips. When anchored in place, all frames shall be plumb and square and the doors shall fit perfectly. Cast bronze thresholds, of the size and type indicated on the drawings, shall be provided for each door and securely anchored and grouted into place.

11-09. Windows.—The steel sash windows shall be of a standard pattern, similar and equal to the manufacture of the Lupton-Truscon Company. They shall be grouted into place as detailed on the drawings. Ventilators with friction pivots, spring catches, chain roller guides and wall clip for chain operation, shall be provided as indicated.

11-10. Glazing.—All sash shall be glazed with clear sheet glass as specified in paragraph 6-08, except that in the toilet room which shall be glazed with obscure or frosted glass. All glass shall be accurately fitted and thoroughly puttied.

11-11. Plastering.—All tile partitions, and the interior faces of the concrete walls in the office and toilet rooms, shall be plastered. These walls shall first be given a scratch coat of cement mortar as specified in paragraph 11-03, and then a finish coat, except the toilet room, composed of plaster of paris, lime putty and white sand. The toilet room shall be given a finish coat of Keenes cement. The surfaces of all partitions on the first floor and in the machinery room shall receive a plaster coat of the above specified mortar. The plastered surface of all walls shall be sand-finished, excepting those of the first floor and machinery room, which shall be trowel-finished. All surfaces shall be free from trowel marks or other defects, and all corners and angles shall be sharp and regular. The ceilings shall not be plastered.

11-12. Floors.

(a) First Floor.—The river wall is constructed to within 2 feet of the finished grade of the first floor. As a final operation to complete the structure, the entire first floor, except the turbine recess, accumulator pit, manhole and pipe trench, shall be brought to the finished grade.

(b) The second and third floors shall be constructed of reinforced concrete as shown on the drawings.

(c) Finish.—All the floors except in the shower bath shall be constructed as specified in paragraph 3-14(b).

(d) The shower stall shall receive a 1-inch monolithic surface course with a granolithic or terrazzo finish. This [fol. 249] surface course shall be composed of 1 part of cement to ¾ part of coarse sand to 1¾ parts of granite, marble, or other suitable material, as approved by the contracting officer. The coarse aggregate shall be graded between 3/16 inch and ¾ inch. The interval of time between the placing of the surface course on the base course of the slab shall not exceed 45 minutes. After the surface course has become thoroughly hard, it shall be ground down and polished to a smooth, regular surface. A wall base of the same material shall be constructed as indicated on the drawings.

11-12. (e) Concrete Cover Plates.—The pipe trenches shall be covered with concrete cover plates. They shall be Class "A" concrete constructed in conformity with details indicated on sheet 20/19B.

11-13. Interior Woodwork.

(a) Trim.—All interior finish, unless otherwise noted, shall be of "A Finishing" grade yellow pine, rules of the Southern Pine Association. The material shall be straight, thoroughly seasoned, dry, and clean when delivered at the site, and shall be kept properly protected thereafter.

(b) Doors.—Doors of sizes indicated on the drawings shall be furnished and hung so as to operate easily. The interior doors for the first floor shall have five raised panels, while those for the second floor shall have ribbbed glass in the top panel. They shall be made of "First Clear" grade white pine, except the panels which may be of yellow pine. The grade of white pine shall conform to the rules of the Northern Pine Manufacturers' Association. They shall be fitted with hinges and knob latches as specified in paragraph 4-31.

(c) Medicine Cabinet.—A medicine cabinet shall be constructed in the wall over the lavatory in the toilet room. The door shall contain a mirror.

11-14. Heating Plant.

(a) General.—The hot water heating system shall be of the 2-pipe gravity type with 1 expansion tank, overhead flow mains, up and down feeding risers, overhead and low

return mains. The installation shall be complete in every respect, substantially as set forth on the plans and described herein, together with such minor details not specifically mentioned as may be necessary to complete the system ready for normal operation. The system shall be operated by the contractor for a time sufficient to satisfy the contracting officer that it is properly installed and in satisfactory operating condition.

[fol. 250.] 11-14. (b) Boiler.—One gas-fired, hot-water, boiler, American Radiator Company's No. 1-GW-9, or equal, with T-Equipment, shall be furnished and erected. This equipment shall include a No. 596 throttling valve, thermostatic pilot, No. 800 Arco water regulator, gas pressure governor, combination altitude gage and thermometer, vitreous enameled draft diverter, drain cocks and pilot cock. The boiler shall be leveled and thoroughly grouted in. A 9-inch diameter No. 14 U. S. Gage sheet steel smoke connection shall be provided between boiler and flue opening with tight fitting volume damper. A 2-inch gas connection from existing gas supply line in the building shall be made to boiler and a heavy all-bronze gas service cock with square head, Crane Company's No. 294, or equal, placed at some convenient point in this connection. A ½-inch water connection from existing water supply line in the building shall be made to boiler and an all-bronze globe valve placed in a position convenient for operation. Galvanized pipe and fittings shall be used for this connection.

(c) Radiation.—The number of sections and tubes, and height and square feet of radiation in each unit are shown on sheet 70/6. All radiators on the second floor shall be cast iron, hot-water pattern, American Radiator Company's "Corto" pattern, or equal. All wall pattern radiators on the first floor shall be of cast iron, American Radiator Company's "Peerless" pattern, or equal. All radiators shall have eccentric drip hub in return end, of screw nipple construction, and shall be tapped 1/8 inch for air cocks. They shall be given a priming coat before assembling.

(d) Expansion Tank.—The system shall be equipped with a heavily galvanized sheet-steel expansion tank with dished and bumped heads and have riveted and calked seams, American Radiator Company's No. 491 Style 5, or

equal. Size of tank and location and size of all connections are shown on sheet 70/6. The tank shall be equipped with water gage and air vent with overflow line not less than 1 inch in size running down to and discharging into a floor drain in the boiler room. The tank shall be supported with expansion tank bracket, American Radiator Company's "Ideal" No. 497 or equal.

(e) Pipe and Fittings.—All pipe between the boiler and the radiators used in this installation shall be of the arrangement and sizes as called for on sheet 70/6 and shall be full-weight, seamless, brass pipe, wrought-iron-pipe size. All pipe ends shall be reamed to remove burrs. All fittings shall be of brass without flaws, with full-cut, deep, tapering threads, heavily beaded and of standard weight. All elbows in main flow and return lines shall be long-sweep pattern. All reducing fittings must be eccentric, so placed as to prevent the formation of air pockets on the upper side of the mains. Unions in main feed and return lines at boiler shall be flange type and all others, up to and including 2-inch, shall be screwed.

[fol. 251] 11-14. (f) Radiator Valves.—Each radiator on the first and second floors shall be equipped with a Packless Hot-Water Valve and a Union Elbow. One radiator, designated "B" and located on the second floor, shall also have a valve in the return line so arranged that the radiator may be removed without interfering with the operation of the heating system. Valves shall be quick opening, bonneted type with union connection, nickel plated all over, and have finished trimmings. These valves shall, wherever possible, be angle type, American Radiator Company's No. 901 or equal. Union elbows shall have rough body and polished trimmings nickel plated all over, American Radiator Company's No. 132, or equal. Compression air valves on all radiators supplied by up feed connections shall be provided. These valves shall be wheel type, nickel plated, American Radiator Company's No. 520, or equal.

(g) Sleeves.—Where pipes pass through floors, walls and partitions, suitable pipe sleeves at least ½-inch larger than the outside diameter of the pipe shall be provided. All risers and radiator run-outs and return lines passing through floors shall be provided with floor plates. Floor plates shall be of brass and be nickel plated.

(h) Supports.—All mains and branches shall be hung from expansion hangers spaced at a distance of not over 10 feet. All pipe hangers shall be constructed of ¾-inch diameter rods or bolts with malleable iron split pipe rings. Trapeze hangers for supporting wall radiators hung from ceiling shall be constructed of ¾-inch diameter rods or bolts and 1½-inch pipe. Rods or bolts shall be provided with double nuts on pipe end of hanger as shown on plans. All pipe and trapeze hangers suspended from ceiling shall be supported from inserts set into beams or ceiling. The concrete inserts shall be of the adjustable loop type for ¾-inch diameter bolts, Kohler Die and Specialty Company's Adjustable Loop Type, or equal. Brackets for wall radiation shall be of the single and double adjustable wall type, American Radiator Company's "Arco" or equal.

(i) Pitch—All horizontal piping shall have a uniform pitch of ¾-inch in 10 feet so the lowest point in the system will be directly over the boiler. The return main shall run parallel to the flow main and pitch in the same direction. All radiators supplied by down feeding risers shall have the flow connection made into upper port and return connection into lower opposite port.

(j) Expansion and Contraction.—All piping shall be erected with due regard for expansion and contraction in order that no undue strains will occur and that the proper pitch shall at all times be maintained. All radiator run-outs must be made with approved swing joints or other suitable flexible connection.

[fol. 252] 11-14. (k) Offsets.—Where necessary to pass obstructions in the building such as beams, pilasters, oil pipes and electric cable, 45-degree offsets shall be provided in mains and risers where possible in order that these may be kept plumb and true and spaced at a uniform distance from walls and windows.

(l) Cutting and Patching.—In general, all inserts, sleeves, hangers, bolts, etc., shall be placed as the work on the building progresses. Should any cutting or patching be necessary, same shall be neatly done in a workmanlike manner.

(m) Testing.—All piping shall be tested from time to time as the work progresses and a final test shall be applied

to the completed installation under normal operating conditions for a time sufficient to satisfy the contracting officer. No painting on any part of the system will be allowed until satisfactory test has been applied and the system found to be absolutely tight.

(n) Both the supply and the return pipes shall be insulated with 85 per cent-magnesia, sectional pipe covering one inch thick, in sections three feet long. The fittings shall also be covered with plastic 85 per cent-magnesia one inch thick. The insulation shall be covered with rosin-size paper over which a covering of eight ounce canvas shall be sewed tightly.

11-15. Domestic Hot-Water Supply—A separate gas-fired continuous flow water heater, Rudd No. 6 or equal, shall be installed. The heater shall be connected to the chimney by a #14-gage smoke pipe of 7-inch diameter. This smoke pipe and the one on the boiler and the connections to the chimney shall be smoke-tight. A ¾-inch rough bibb cock for hose connection shall be provided in the boiler room. A ¾-inch line shall be run to the shower and basin on second floor. The pipe and fittings shall be seamless brass, wrought-iron-pipe size, for both hot and cold water. The hot water pipes shall be insulated as specified in paragraph 11-14(n).

11-16. Plumbing.

(a) General.—The plumbing shall conform to U. S. Army specifications for plumbing fixtures No. 83-6, or to the products of Crane Company or equal.

(b) The following fixtures shall be furnished and installed complete:

[fol. 253]

U. S. Army Specifications		Crane Co.
Apron Lavatory—No. 20 RVB	or	18-inch x 20-inch C752-P5 or equal
Water Closet —No. 34V	or	No. C11003
Shower —Outfit No. 48 with floor drain and trap No. 3, Fig. 2	or	No. C4360-B with floor drain C34552, also rod and 1002 duck curtain with fixtures; or equal.

11-16. (c) The shower stall shall have a 4-inch high terrazzo curb in front. It shall have ⅞ inch thick by 6 feet high slate slab sides and back with terrazzo floor and curb as shown on drawings.

(d) The lavatory, shower and toilet shall drain into the 3-inch soil pipe shown on the drawings and shall be properly vented. Traps shall be installed so that the entire drainage system can be cleaned. All downspouts and waste pipes shall be cast-iron soil pipe conforming to paragraph 4-27. The floor drains shall be laid within the 2 feet of concrete forming the basement floor. Downspouts shall be installed as shown on sheets 70/2 and 70/3. The water piping, the plumbing fixtures and the drainage system shall be tested by being filled with water to prove it water-tight.

11-17. Electrical Work.—A complete illumination system shall be installed as specified under Section XIX.

11-18. Painting.

(a) Metal Work.—All metal work shall be painted with red lead and aluminum paint as specified in paragraphs 4-45 and 4-46.

(b) Woodwork.—The woodwork shall be stained and shall receive 2 coats of varnish, all as approved by the contracting officer.

(c) Concrete.—The floors, unless otherwise directed, the ceilings and all interior walls shall receive 2 coats of a paint especially adapted to concrete surfaces, as specified in paragraph 6-09. The floor of the shower shall not be painted.

(d) Color.—The color of all final painting shall be subject to the approval of the contracting officer.

11-19. Crane.—There shall be provided and installed, as indicated on the drawings, a hand-operated, single-I-beam, traveling crane equipped with a 5-ton chain block which shall have a 3-foot extended shaft, all of standard, approved manufacture. It shall be arranged for 12-foot lift. All necessary operating beams and rails shall be provided and erected complete and in operating condition.

11-20. (a) Payment for the walls, floors, partitions, roof, doors, windows, heating plant, electric lighting conduit system, plumbing and all other metal work of the building [fol. 254] proper, but not the wiring and illumination fixtures, will be included in the contract lump-sum price for "Power House."

11-20. (b) Monthly estimates, for the work completed, will be given on the basis of the following schedule of percentages of the contract price:

	Percentage of contract price
Concrete	27.0
Hollow Tile	2.0
Roof	5.0
Roof Covering	5.0
Structural Steel and Iron Work	15.0
Sheet Metal Work	3.0
Metal Doors and Steel Sash Windows	9.0
Floors	6.0
Plastering	4.0
Interior Wood Work	1.0
Heating, Hot Water and Plumbing Systems	16.0
Hardware	1.0
Painting	2.0
Traveling Crane	4.0
Total	100%.

Section XII—Power House Machinery

12-01. General. (a) The contractor shall install, complete and ready for operation, in the power house the following items of machinery which will be furnished by the United States:

(1) Two vertical, single acting, triple-plunger type pressure pumps of 200-gallon per minute capacity each with pressure of 430 pounds per square inch. Each pump will be chain-driven by an electric motor.

(2) Two 60 H. P., 870 full load R. P. M. single speed normal torque, low starting current, open squirrel cage induction type motors designated for operation on 440 volt, 3-phase, 60-cycle, alternating current, and equipped with motor control.

(3) Electric pressure regulator—three pressure switches.

(4) Two 3-inch hydraulic pressure relief valves.

[fol. 255] (5) One 700-gallon-capacity pump priming tank.

The above equipment will be purchased by the United States and used for temporary operation of Lock "A"

prior to the construction of the permanent power house under this contract. This equipment shall be transferred from the temporary installation made by the United States on the middle wall of the locks to the permanent power house and installed by the contractor in the power house with the remaining equipment to be furnished and installed by the contractor as described below.

12-01. (b) The contractor shall furnish and install, complete and ready for operation, the following items of machinery in the power house:

(1) One hydro-pneumatic accumulator with pressure gage.
(2) One 2100-gallon-capacity oil storage tank.
(3) One automatic swing check valve.
(4) One gasoline-electric standby unit.
(5) One gasoline supply tank.
(6) Cooling water tank and cover.
(7) One air compressor.
(8) One air receiver.
(9) One air signal.
(10) All pipes, fittings and valves needed for complete installation of the machinery and equipment specified in paragraphs 12-01(a) and (b).
(11) Switch board, including control equipment and all necessary wiring and conduits.

12-02. Hydro-pneumatic Accumulator.—The accumulator shall be a straight-run hydro-pneumatic closed vessel, approximately 24 inches inside diameter, divided into two compartments by a solid circular partition. The smaller compartment shall have approximately 40 gallons capacity and the larger compartment shall have approximately 120 gallons capacity. The vessel shall be designed, built and tested hydrostatically to a pressure of 1500 pounds per square inch, and be suitable for a normal working pressure [fol. 256] of 500 pounds per square inch. Each compartment shall be capable of carrying the above loads with the other compartment unloaded. The vessel shall have outlets for attachments and connections as shown on drawing No. 71/3. The vessel shall be constructed by the fusion process of welding in accordance with the rules for the construction of unfired pressure vessels, 1931 edition, A. S. M. E. Boiler Construction Code, and shall comply with the Hart-

ford specifications for a vessel as described above. The accumulator shall be provided with two sight gages, each made up with glass tube and two ¾-inch angle valves of guard rod pattern with guard rods, packing and packing nuts, suitable for a working pressure of 500 pounds per square inch.

12-03. Oil Tank.—(a) One 2100-gallon capacity oil-storage tank shall be constructed as shown on sheet 71/3. The tank shall be oil-tight.

(b) The tank shall conform to the dimensions shown on the drawing. The pipe flanges shall be of forged steel, finished face, and shall be welded on. The joints in plates and the flange angles shall be continuously welded. The bracing angles in the bottom shall be stitch welded both at heel and toe and at least 25 per cent in length of the contact lines. The continuous welds shall be ⅜-inch. The angles shall be structural steel. The plate shall be of the material specified in paragraph 4-22. Coated welding rod shall be used.

12-04. Automatic Swing Check Valve.—The mechanism shown in assembly on sheet 71/14 and detailed on sheets 71/15 and 71/16, shall be furnished and installed to operate as follows: The vertical check valve shall seat oil-tight (100 per cent). It shall have an extended lever arm with a packed gland. The valve disc shall be keyed solidly to its stem and the movement of the valve disc shall be mechanically operated through the lever arm by means of a movable weight which is actuated by a plunger inserted in the oil system, all as shown and dimensioned. A sufficient number of removable weights are required to vary the operating pressures. The valve stem and weight plunger shall be packed so that there will be no leakage of oil. The weight shall be raised at a certain definite pressure and shall be lowered at a pressure 35 pounds less than the pressure at raising. The springs dampening the movement of the lever arm shall be installed with a slight initial compression, and shall be arranged so that the valve will unseat on a slightly unbalanced pressure from below, but will prevent the valve from slamming shut due to increase in velocity head when closing. The shaft, disc, disc nut, and the seat of the check valve shall be of stainless steel. The mechanism shall be constructed to withstand a working oil pressure of 500

pounds per square inch. The weight shall make its full upward movement immediately when the opening pressure is attained and shall make its full closing movement immediately when the pressure drops to that required for closing.

[fol. 257] 12-05. Pressure Gage for Hydro-Pneumatic Accumulator.—A pressure gage shall be provided for mounting at top of hydro-pneumatic tank, suitable for indicating pressures from 50 to 700 pounds per square inch, within 1 per cent throughout the entire range. The case shall be brass with black enamel finish and polished brass ring. The gage shall have a white enamel metal dial, about 6 inches in diameter, with dead black numerals and graduations. Support for the gage shall be its screw fitting into the tank fittings as indicated on sheet 71/2. This item is shown as piece 71/4-L.

12-06. Gasoline-Electric Standby Unit.

(a) General.—The unit shall consist of an 8-cylinder, 240-H. P. gasoline engine, direct-connected to a 156 K. V. A. revolving field, synchronous type, electric generator with direct-connected exciter, mounted on a common cast iron bed plate of suitable dimensions. It shall be water-cooled, without fan or radiator, and shall be installed complete with gasoline supply and water cooling tank, fuel, water supply, and return line connections, and all other necessary operating appurtenances, including electrical connection to main switchboard. The detail parts and assemblies are indicated on sheets 71/1, 5, 6, 7, 8, 9, 10, 11, 12 and 13.

(b) Foundation and Support.

(1) The complete unit shall be mounted upon a separate concrete base and structural steel support as indicated on drawings 71/5 and 71/6. After complete erection of the steel support the forms for the base shall be constructed with the clearances indicated on the drawings. All fixed metal, including inserts, reinforcing steel, piping, conduit and plate rabbet, shall be set firmly in place before the concrete is poured. Provision shall be made that no concrete enter any opening in inserts, pipe or conduit. The first pour concrete shall be brought to an elevation 1½ inches below the finished floor line.

(2) After the concrete has taken its final set, the base casting of the unit shall be erected in place, supported upon

steel wedges and held down by the anchor bolts. Waste shall be packed around the anchor bolt sleeves to prevent mortar from entering. The surface of the concrete shall then be thoroughly cleaned, roughened and dampened, and a wash coat of neat cement applied, after which mortar of equal parts of cement and fine aggregate shall be worked [fol. 258] into place and neatly finished to elevation 610.0. After this is set, the forms shall be completely removed.

12-06. (b)-(3) Base Isolation.—Cork isolation blocks 3 inches thick by 5½ inches wide shall be fitted into the 3-inch space that isolates the concrete slab for the standby unit from the adjacent second floor slab. The blocks shall be fitted into place, then removed and dipped in hot asphalt and the adjacent concrete surfaces also painted with hot asphalt, before setting the blocks permanently. The blocks shall be of Armstrong Cork Machinery isolation, light density, or approved equal.

(c) Bed Plate.—The bed plate shall be integral for engine and generator and shall be cast iron, not less than 1 inch thick, provided with a drip edge and transversely and longitudinally ribbed. It shall be accurately machined for mounting the engine and generator and shall be designed for mounting upon the support and base shown on drawing 71/5.

(d) Gasoline Engine.

(1) The engine shall be completely equipped and shall be the Sterling, Dolphin "C" or approved equal. It shall be of the four-cycle type and shall have a rating of 240-brake H. P. at a normal speed of 1200 R. P. M. It shall have clockwise rotation when viewed from the starting bar end and have sufficient power to produce 156 K. V. A. (80 per cent power factor) at the switchboard continuously. The engine shall be equipped with a governor, which in combination with a throttle valve shall provide speed regulation with 3 per cent from ¾ load to full load, or when full load is suddenly thrown on. The speed variation from full load to no load shall not exceed 5 per cent of normal or more than 5 per cent from ¼ load on dynamometer test.

(2) The crank shaft shall be a 1-piece chrome-nickel steel forging. It shall be counterweighted and be dynamically and statically balanced.

(3) Main bearings shall be accurately fitted, and be anchored against side thrust. Oil under pressure shall be suitably admitted to the inside of each main bearing shell.

[fol. 259] 12-06. (d)-(4) The cylinders shall be of special cylinder iron having a tensile strength of not less than 35,000 pounds per square inch. They shall be cast in pairs. The inner walls of the cylinders shall provide for full length of piston travel.

(5) Cylinder heads shall be of the same material as the cylinders.

(6) Pistons shall be of a suitable light weight alloy and shall be cast with large piston pin bearings.

(7) Piston pins shall be steel, hollow, hardened, accurately ground and locked in place.

(8) Connecting rods shall of high grade forged steel, heat treated. The lower end shall be fitted with bronze babbitt lined shells and caps.

(9) Push rod guides shall be of bronze and be of the removable type.

(10) Cam shaft shall be of forged steel, heat treated, accurately ground on all journal bearings and cam profiles.

(11) Valves shall be of special steel, of large area, accurately fitted and ground to fit the valve seat.

(12) Exhaust manifold shall be a close-grained grey iron casting fully water-jacketed and provided with suitable flange connections having a 3½-inch straight pipe thread for exhaust pipe, and shall be provided with an auxiliary water overflow for exhaust cooling as shown on drawing 71/12.

(13) Water circulating pump shall be of the centrifugal gear or plunger type and shall be positive drive. The in and out cooling water connection of the engine shall be 1¼-inch pipe tap.

(14) Oil circulating pump shall be of the positive type and shall be positively driven by the engine. The pump shall be removable from the engine without the necessity of dismantling the engine or breaking connections.

[fol. 260] 12-06. (d)-(15) Ignition shall be either dual or triple. The spark plug wiring shall be removable from the engine in a unit without removing from holders.

(16) The flywheel shall be securely attached to the crank shaft, ahead of the flexible coupling.

(17) The flexible coupling shall be the fibre disk type or equal approved.

(18) Lubrication.—Oil shall be supplied under pressure to the main bearings, connecting rod bearings, valve operating mechanism, cam shaft and timing gears.

(e) Engine Accessories.—The following operating accessories shall be provided:

(1) One electric starter.

(2) One electric generator.

(3) One 12-volt battery, in steel black japanned case.

(4) One oil cooler and filter.

(5) Two carburetors.

(6) One tachometer.

(7) One engine-driven gasoline pump.

(8) One hand-operated priming pump.

(9) Two sections of 1¼ inch flexible metal hose for water connections. (See drawings 71/7 and 71/9.)

(10) One lever-handle-operated cock in cooling water line with necessary linkage for operating ignition switch. (See drawings 71/7 and 71/9.)

(11) One ignition switch interlocked with cooling water valve.

(12) One 1-gallon capacity gasoline priming tank complete with strainers and fittings for connecting to gasoline line and vent. (See drawing 71/9.)

[fol. 261] 12-06. (e)-(13) One water-cooled exhaust line with necessary spring-cushion exhaust pipe supports and brackets. (See sheets 71/7 and 71/10.)

(14) One water-cooled exhaust muffler of the Maxim Silencer "M-2" type or approved equal.

(15) One set of necessary adjusting tools and wrenches complete for equipment furnished.

(16) One instrument board mounted on the engine and containing the oil pressure gage, ammeter, distributing switch, starting switch and tachometer.

(f) Generator.

(1) The generator shall be of the revolving field, synchronous type with direct-connected exciter. It shall be of standard open construction suitable for mounting on the engine bed plate and be similar and equal to the product of the Electric Machinery Manufacturing Company.

(2) Rating.—The generator shall have a rating of 156 K. V. A. 80 per cent lagging power factor, 125 K. W., 1200 R. P. M., 3-phase, 60 cycles, 480 volts, 188 ampere.

(3) Temperature rise shall conform to the standards of the American Institute of Electrical Engineers and the National Electrical Manufacturing Association.

(4) Exciter.—The exciter shall be of sufficient capacity to give the generator good regulation up to 150 per cent of normal load, and designed for operation with a voltage regulator. Its terminal voltage shall be 125 volts D. C. It shall be supported on the generator end bracket, the armature being pressed on an extension of the generator shaft. Rheostat for both the exciter and generator field shall be furnished, suitable for mounting on the back of the generator panel of the power house switchboard as indicated on sheet 29/2.

(5) Terminals.—The armature terminals shall be located on the right-hand side of the generator, reference being at the exciter facing the drive, and shall be housed in a cast iron terminal box, with a removable cover to which one [fol. 262] 3-inch iron conduit may be readily connected from below. The connection of the armature terminals to the switchboard bus shall be made so that the direction of rotation of the phase sequences shall be clockwise. The stator windings shall be star-connected and the neutral connections shall not be brought out. The field leads shall be brought

out in a suitable terminal box on the under side of the exciter frame.

12-06. (f)-(6) Frame and end brackets shall be of refined cast iron, the feet being cast integral with the frame or equally rugged construction. All screws, bolts and other steel parts shall be "Parkerized" or similarly treated to prevent rust.

(7) Bearing housings shall be split on both the driving and exciter ends and the top half of the housing shall be capable of removal without disturbing the end bracket. The top half shall be held in place by 4 bolts.

(8) Bearings of both the driving and exciter ends shall be of the same size and shall be of the split-sleeve type, or equally suitable construction.

(9) Insulation.—The stator and rotor windings shall be insulated with Class "A" insulation as defined by the American Institute of Electrical Engineers, and be impregnated with moisture and oil-proof varnish.

(10) Amortisseur windings shall be provided and *and* shall be of copper bars driven through slots in the pole faces and electrically welded to a common end ring or equally rugged construction.

(11) Collector rings shall be of bronze or brass, shrunk onto the shaft and adequately insulated from the shaft by mica or equally rugged construction.

(12) Brush holders shall be of rugged construction, and if of ferrous material, shall be "Parkerized" or similarly treated to prevent rust.

(13) Tests shall be in accordance with the American Institute of Electrical Engineers' standards, as directed by the contracting officer.

[fol. 263] 12-06. (g) Battery Charger.

(1) A battery charger shall be provided and installed in the switchboard enclosure as indicated on drawing 29/2. It shall be capable of operating on 110 volts A. C. and shall have an output of 7½ to 45 volts direct-current and have a capacity of 6 amperes. It shall be provided with an adjustment to cut down the charging rates to 1 ampere, and also

with an ammeter to indicate the direct-current output. It shall be so designed that the battery will not discharge in case the A. C. voltage is interrupted.

(2) The charger shall be totally enclosed in a steel cabinet with hinged doors provided to make all parts easily accessible, and be equipped with fuses for protection against overloads and short circuits. The battery charger shall be the Westinghouse Electric & Manufacturing Company "Rectigon" style No. 598745 or equal.

12-07. Gasoline Supply Tank.

(a) A gasoline supply tank of 1,000 gallons capacity as indicated on sheets 71/7 and 71/8 shall be provided and installed in the recess shown on sheets 40/4 and 71/7, together with its supports, connections and equipment, as indicated or listed on sheets 71/8, 71/10, 71/11 and 71/13. The tank shall be approximately 52 inches inside diameter at the ends by 111¾ inches long overall, and shall be made of 5/16-inch black steel plate as specified in paragraph 4-21. The longitudinal and girth seams of the shell shall be single-row riveted and also welded inside before assembling the heads. All tank flanges shall be riveted and also welded inside the shell. Rivets in all seams shall be ⅜-inch round head, of structural steel "rivet" grade, spaced 1¼ inches on centers, driven hot and fully headed on both ends.

(b) The heads of the tank shall be outside flanged and shall be riveted and calked at the exterior joint, but before assembling to the shell, the surfaces adjacent to the inner joint shall be copperized or otherwise prepared for shot-solder so that this inner joint will be soldered tight by flooding the joint while hot, after the heads are riveted and calked.

(c) Should the shell be made in 3 rings, the longitudinal seams shall be staggered.

(d) Five standard forged steel tank flanges and one 16-[fol. 264] inch diameter manhole shall be located on the top center line of the tank. The first flange located 8¼ inches from the downstream end of the tank shall be 3½ inch pipe size and the 4 other flanges shall be 2-inch pipe size and spaced as indicated on sheet 71/8. The fifth flange shall be located as near as practicable to the upstream end of the

tank and be fitted with a 2-inch by 1¼-inch double bossed bushing, with a 1¼-inch galvanized pipe extending to within ⅛-inch of the tank bottom. The top of the flange opening shall be closed with 1¼-inch galvanized short nipple and pipe cap. The tank supports shall be set to provide a pitch of 1/16 inch per foot with the upstream and lower. Each tank flange shall be hot pressed to the correct radius of the shell ring to which it is to be attached. The 3½-inch tank flange shall be provided with a 3½ by 2-inch double bossed bushing to which, inside the tank, shall be connected a 2-inch galvanized long nipple ground seat union, suction riser, bottom swing connection with pipe and a float suction equal to S. F. Bowser Accessory, Figure 280, all as indicated on drawing 71/8. As part of the tank equipment, at the fourth flange, there shall be provided a 2-inch O. D. steel filling tube, brass gauze strainer, short nipple, lower half of filling cap and brass bushing (as shown in Section CC, sheet 71/8), and the locking-type filling-cap, complete with all bronze padlock and duplicate keys. Manhole shall have ¼-inch cover plate and a copper-bound asbestos gasket.

12-07. (e) The tank shall be subject to an air-pressure test. The air pressure shall be not less than 200 per cent of the pressure caused by the maximum normal loading on the shell with the tank full of gasoline (approximately 2 pounds per square inch). The tank shall be made air-tight at this pressure before shipment from the factory.

(f) All pipe connection for gasoline lines shall be made up with shellac.

12-08. Cooling Water Tank and Cover.

(a) A cooling-water tank of 235-gallon capacity shall be furnished and installed in accordance with sheet 71/7. The tank and cover shall be constructed as indicated on sheet 71/12. All angles shall be of structural steel. The bottom and sides shall be of black steel plate as specified in paragraph 4-21. All seams shall be continuous arc-welded with coated welding rod. The angles shall be secured at both heel and toe by stitch welding for at least 25 per cent of the length of the edges. After fabrication, the tank shall be hot galvanized. After galvanizing, all pipe threads shall be rechased. Tank shall be absolutely water-tight. The

tank cover, including the steel wire screen specified in paragraph 4-23, shall be completely assembled with the tank.

[fol. 265] (b) Pipe and Supply Line Connections.—All connections shall be made between the engine and gasoline and water-cooling tanks and to all gasoline and water supply lines installed under previous contracts. These connections shall be made as indicated on drawings 71/7, 71/8, 71/9 and 71/12.

12-09. Air Compressor.—A motor-driven air compressor shall be furnished and installed. It shall be Westinghouse Traction Brake Company's type "NB" or approved equal. The motor shall be 440-volt, 60-cycle, A. C. The compressor shall supply not less than 25 cubic feet of free air per minute in intermittent operation. The unit shall be equipped with an across-the-line starter (see paragraph 12-18(b)-(4)), an automatic starter with governor which shall be regulated to start the compressor at 125 pounds tank pressure and stop it at 130 pounds tank pressure, an unloader and an air strainer. The unit shall be designed for 125 pounds working pressure. Bidder shall furnish complete data on unit he proposes to furnish.

12-10. Air Receiver.—An air storage tank approximately 30 inches in diameter by 7 feet in length, with a capacity of 35 cubic feet, shall be furnished and installed. The tank shall be constructed in conformity with the standard specifications of the American Society of Mechanical Engineers' Boiler Code, for unfired pressure vessels, 1931 edition. The working pressure for the tank shall be 130 pounds, gage. If so constructed, the tank may be mounted upon the supports indicated on drawing 71/3 or, if a base integral with the tank is sufficient, the supports may be omitted. A drain with ½-inch cutout cock, a 1½-inch cutout cock in the supply line, a safety valve between cutout cock and tank, and a suitable gage, adjacent to the tank, shall all be furnished with the tank. The inlet and outlet shall be tapped for 1½-inch pipe connections. The tank shall be heavily galvanized throughout.

12-11. Air Signal.

(a) General.—An air signal as described below shall be furnished and installed complete with solenoid-operated

air valve, all necessary air lines from air receiver to valve and from valve to air signal, drain cock, all necessary wiring and supporting bracket. Necessary pipe and fittings for installation are included in list of material on sheet 71/4.

(b) Mounting.—The signal shall be mounted on the bracket shown on drawing 71/15, on the lock side of the power house near the downstream end. The center of the signal bells shall be approximately 6 inches from the face of the wall, 3 feet 2 inches from the corner of the building, as indicated on sheet 71/2.

(c) Signal.—The signal shall be of the 2-horn type, the [fol. 266] horns to point in opposite directions. The bells of the horns shall be chromium plated and shall be fitted with suitable chromium plated screens. The air signal unit shall be entirely weather-proof. The diaphragm material shall be bronze. It shall have a blended, pleasing, deep chime and be designed to operate with air on a pressure of 100 pounds per square inch, with a maximum consumption of approximately 2 cubic feet of free air per second. The air signal shall be similar to Type "A", No. 89348, as shown on page 4 of Westinghouse Air Brake Company's catalogue No. 3224-1, or approved equal. The mounting shall be of the mill type arranged for attaching to bracket 71/15-10 on sheet 71/15.

12-11. (d) Control.—The signal shall be operated by a solenoid air valve and remotely controlled by single pole push button switches located on the power house switchboard and on the remote control station located on the land wall. The schematic wiring diagram of the air signal is indicated on sheet 29/1. The air signal shall have a capacity of 100 separate distinct blasts per minute and a range of 1 mile under any weather conditions and 2 miles under favorable weather conditions.

(c) The Solenoid-Operated Air Valve shall be located in the power house close to the air signal and connected to the control circuit in the manner shown. The solenoid shall be wound to operate on 440 volts, 60 cycles, A. C. The valve shall be the normally closed type, General Electric Company's catalogue No. 177396G-4 or equal.

12-12. Piping.—The pumps, oil tanks, hydro-pneumatic accumulator and all necessary pipe, fittings and acces-

sories shall be installed and connected as detailed on the drawings, complete and ready for operation. Pipe, fittings and valves shall conform to the requirements under Section IV.

12-13. Switchboard.

(a) General.—The contractor shall furnish and install in the power house at the location indicated on the plans a 5-panel, totally steel-enclosed, free standing dead front, rear door semi-cubical type of switchboard. This switchboard provides the control for the entire lock and dam electrical system, which is laid out as shown on the schematic connection diagram 29/1. All materials shall conform to Section V wherever applicable.

(b) Arrangement of Panels and Circuits.—Facing the switchboard from the front, the panels left to right shall be arranged in a continuous row in the order stated below. Each panel shall control the circuits as listed.

Panel No. 1.—Combined generator, exciter and regulator [fol. 267] panel for gasoline-electric standby generator unit. Capacity: 156 K. V. A., 80 per cent P. F., 125 K. W., 480 volts, 3-phase, 60 cycles, 188 amperes, with 125-volt D. C. direct-connected exciter. One battery charger feeder, single-phase, 2-wire, 60 cycles, 115 volts, 15 amperes.

Panel No. 2.—Incoming power supply and meter panel. Capacity 440 volts, 3-phase, 60 cycles, 400 amperes maximum.

Panel No. 3.—Lighting and signal panel;

One primary lighting feeder, 3-phase, open delta, 3-wire, 60-cycle, 480 volts, 50 amperes.

One dam lighting feeder, single-phase, 3-wire, 60-cycle, 230 volts, 50 amperes.

One building lighting feeder, single-phase, 2-wire, 60-cycle, 115 volts, 70 amperes.

Two lock lighting feeders, single-phase, 3-wire, 60-cycle, 230 volts, 50 amperes, with magnetic contactor control as indicated.

One air signal feeder, single-phase, 2-wire, 60-cycle, 440 volts, 35 amperes.

One navigation signal light feeder, single-phase, 2-wire, 60-cycle, 440 volts, 35 amperes. Motor control switches for lock signal lights and air signal.

Panel No. 4.—7 circuit power feeder panel:

One locomotive crane feeder, 3-phase, 3-wire, 60-cycle, 440 volts, 225 amperes.

One bridge crane feeder, 3-phase, 3-wire, 60-cycle, 440 volts, 200 amperes.

Two roller motor feeders for the dam, 3-phase, 3 wire, 60-cycle, 440 volts, 225 amperes each.

Two tow-haulage engine feeders, 3-phase, 3-wire, 60-cycle, 440 volts, 50 amperes.

One air compressor feeder, 3-phase, 3-wire, 60-cycle, 440 volts, 35 amperes, and across-the-line contactor control.

Panel No. 5.—Squirrel cage induction motor panel; capacity 60-H. P., 440-volt, 3-phase, 60-cycle, 900 R. P. M. synchronous speed each, with across-the-line contactor control wired as indicated on sheet 29/1 and mounted in the switchboard cubicle as indicated on sheet 29/2.

[fol. 268] 12-13. (c) Equipment and Wiring.—The arrangement of the equipment and the construction of the switchboard shall conform to sheet 29/2. The rating of all equipment shall be as indicated on sheet 29/1. The wiring shall conform to the schematic diagram 29/1, and the switchboard wiring diagrams 29/3 and 29/4. All wiring shall be on the back of the panels. All power wiring shall be of the proper cross-section for the currents to be carried, and no wire shall be less than No. 8 A. W. G. Control wire shall be not less than No. 12 A. W. G. as specified in paragraph 5-06. All control wiring shall be rigidly fastened on the back of ebony asbestos panels by means of cleats, and brought out to terminal blocks when it leaves the panels. All terminal blocks shall be suitably located for making connections. All control wiring on the steel panel shall be run in wiring gutters provided on the sides of the panels, and be brought out to terminal blocks when it leaves the panels. All connections from the main bus to disconnecting switches or circuit breakers and from disconnecting switches to circuit breakers, shall be of copper bus of a rectangular cross-section. All buses shall be mechanically rigid and designed to carry the rated current of the circuit with a maximum temperature rise of 25 degrees C. All connections to the main bus shall be clamped and sweated; all other connections shall be securely bolted so as not to heat.

All equipment of the same type and function shall be of the same manufacture. All parts of the same equipment shall be interchangeable and such as will require the smallest possible number of different parts to be carried for replacement.

(d) Panels.—All panels shall be of ⅛-inch "stretcher-Leveled" steel of the dimension shown on sheet 29/2, with a ½-inch radius bevel on all front edges, and shall be similar and equal to the standard construction of the Westinghouse Electric and Manufacturing Company. All panels of the switchboard shall be bolted together in a manner to effect a neat appearance. No unsightly gaps or wide joints to be visible in the completed assembly.

(e) Rear doors.—The rear doors shall be of the size indicated on sheet 29/2, provided with louvers, jambs, handles and fasteners, similar and equal to the standard construction of the Westinghouse Electric and Manufacturing Company.

(f) Finish.—All panels, doors, sides and rear enclosures shall be finished with 1 coat of filler and 2 coats of dull black marine finish. The interior shall be of the same finish.

(g) Name plates.—Suitable name plates shall be furnished for all circuits or panels as indicated on sheet 29/2. Name plates shall be black bakelite, with engraving filled with baked white enamel.

[fol. 269] 12-13. (h) Two rubber insulating mats shall be furnished and placed in front and rear of the switchboard. They shall extend the full length of the switchboard. The mat in front shall be 36 inches wide. The one in the rear 2 feet 11 inches, and be cut to fit the space between the switchboard and the wall.

(i) The drawings included in these specifications are furnished to indicate the general arrangement of material and equipment only, and the contractor shall be responsible for the mechanical design and structural details of all material furnished by him. The contractor shall be responsible for the final assembly and shall furnish all necesary items of equipment necessary to complete the switchboard ready for operation in conformity with the intent of these specifications.

(j) Factory Assembly and Inspection.—The switchboard shall be erected and wired at the factory and inspected by the agent of the contracting officer, to whom due notice shall be given when ready for inspection.

(k) The arrangement and type of equipment shall in general conform to the layout given on the detail drawings. The contractor may, however, modify this layout if found advisable, to more readily conform to the space available and to the equipment he propbses to utilize. The contractor shall submit in triplicate, to the contracting officer for approval, detail drawings showing in full the switchboard layout he proposes to utilize, before any corresponding work is begun. The over-all dimensions of the switchboard and number of panels must be maintained as specified.

(l) The contractor shall furnish the contracting officer with 5 schematic wiring diagrams and 5 construction wiring diagrams of the switchboard as installed. A schematic wiring diagram and a construction wiring diagram shall be framed in glass and mounted on the wall of the power house as directed by the contracting officer.

12-14. Conduits and Cable Troughs in Power House.—The contractor shall install all necesary conduits and cable troughs for making the connections from the switchboard to the cable riser, power house electrical equipment and conduits on the dam, as specified in paragraph 19-04. The necessary conduits, their location and method of installation shall be as indicated on sheet 29/6.

12-15. Painting shall be in conformity with paragraph 4-44 and 4-45.

12-16. (a) Payment will be made at the lump sum bid for "Power House Machinery" and shall include all pipe and fittings inside the power house except those for the [fol. 270] heating plant, and all electrical cable and connections inside the power house except those for the power house lighting circuit. It shall not include conduit embedded in the walls or floor of the power house, which will be paid for under the unit prices bid for the various types of conduit used. (See paragraph 19-04(h).)

12-16. (b) Partial payments will be made monthly based on the following percentages of the total lump sum bid:

(1) Two vertical triplex motor-driven oil pumps	6%
(2) Hydro-pneumatic accumulator with pressure gage	6%
(3) Pressure regulators, relief valves, oil tanks and necessary pipe and fittings	8%
(4) Automatic swing check valve	1%
(5) Gasoline-electric stand-by unit	44%
(6) Air compressor and signal	5%
(7) Switchboard, including control equipment and all necessary wiring and conduit	30%
Total	100%

In making monthly payments, 60 per cent of the price determined on the basis of the above percentages will be paid for all equipment delivered and accepted at the site of the work in accordance with the provisions of paragraphs 12-01(b) and 14-46.

Section XIII—Roller Gates

13-01. General.—(a) The dam shall be composed of five steel roller gates, 26 feet in height from the concrete sill to the crest and operating between masonry piers with 100 feet 3½ inches clear openings. One gate shall be of the submergible type, capable of being lowered five feet below the normal position. The gates shall be raised and lowered on steel racks by means of sprocket chains operated by electric hoists mounted and housed on top of the piers. Each gate shall be operated by a single hoist at one end. The racks shall be attached to steel-beam grillages embedded in the masonry in the recesses in the piers at each end of the gate.

(b) The general design and arrangement of the gates and certain detail dimensions are indicated on sheets 47/1, [fol. 271] 47/2 and 47/3. The contractor shall design and prepare all detail drawings for fabrication and erection of the gates and machinery in accordance with the requirements herein.

13-02. Drum and Apron.—(a) The gate shall consist of cylindrical drums 108 feet, 5½ inches in length overall and 19 feet, 4 inches in diameter inside of the skin plating, with a curved apron connected to the drum and projecting downward when the gate is in normal position to make a water-

tight closure on a steel beam embedded in the concrete sill. The apron shall close on the sill at a point not less than four feet upstream from the centerline of the drum when in normal position to insure that there is at all times a substantial downward force to effect positive closure of the gate.

(b) The drum shall be rigidly braced internally by means of lateral stiffeners and transverse frames arranged as indicated in sheet 47/1. Size and thickness of plates and members shall not be less than those shown on the drawings. At each end of the drum, in line with the center of the rolling track attached to the pier, there shall be provided a load disc composed of heavy, reinforced plates. The load discs shall have manholes in the centers, with steel ladders leading down to the bottoms of the end chambers. Steel ladders shall also be provided adjacent to the load discs at each end and extending from manholes in the shell plating at the top of the drum to a steel grating walkway which shall be constructed throughout the entire length between load discs. An anchor for the sprocket chain shall extend through the skin plate and shall be securely fastened on the inside of the drum. Suitable drain holes shall be provided in the downstream skin plate to permit rising tail water to flood the drum and to drain the water when the gate is raised. The apron shall be adequately proportioned and rigidly braced and attached to the drum. The entire unit shall be conservatively proportioned in all its parts to resist the static loads and torsional stresses incident to its operation.

13-03. Water Seals and Pier Armatures.—(a) The side water seals at each end of the gate shall consist of flexible steel-plate diaphragms attached to the drum and apron. The plate shall be 5/16 inch thick and shall be reinforced with angles. The outer edges shall be fitted with protecting angles and treated white oak seal strips of ample size, which shall bear on steel-plate armatures embedded in the piers. The diaphragms shall be dimensioned so that no part of them will project beyond the pier armature when the gate is being raised. They shall be extended on the downstream side of the drum to form shields for the gate tracks in the piers.

(b) The pier armatures shall consist of ⅝-inch plates reinforced with angle stiffeners and embedded in the faces of the concrete piers as indicated on the drawings.

[fol. 271a] 13-03. (c) Channels shall be welded to the back side of each pier armature opposite the timber seal strips, to form water-tight conduits. These conduits are intended for possible future installation of electric heating elements and shall terminate in a junction box as shown on sheet 56/1. No heating elements will be required under this contract.

(d) The bottom seal shall consist of a treated white oak timber bolted to a channel and protecting angle attached to the bottom of the apron throughout the entire length of the gate. It shall seat on a 12″ x 10″ CB @ 64# steel beam embedded in the concrete sill. A recess shall be left in the sill and adjustable anchor bolts provided for the sill beam when the concrete is originally placed, as shown on sheet 40/5. The beam shall be adjusted and grouted in place after the gate is completely erected.

13-04. Spur-rims and Racks.—Cast steel spur-rims shall be bolted around the circumference of the drums at both ends and shall engage in cast-steel racks set in the piers. The rims and racks shall be amply proportioned to withstand loads incident to the gate operation. They shall be cast in convenient sections. The sections may vary in size depending on the variation in load due to the different gate positions.

13-05. Embedded Substructure.—(a) Each steel-beam grillage embedded in the masonry in the lower side of the gate recesses in the piers shall consist of a 14″ x 12″ CB @ 84#, eight 5¾ x 9½″ CB @ 60#, and a 1-inch plate of varying dimensions, supported and assembled as indicated on sheet 40/16. The plate shall be riveted to the upper flange of the large beam and planed to receive the cast-steel rack and rolling track. The plate and all fixed anchor bolts and nuts for attaching the rack shall be of stainless steel.

(b) Recesses shall be left in the original masonry as indicated on sheet 40/10 and the complete substructures shall be erected and grouted in place after the gate is erected and the racks aligned and adjusted to final positions. Brackets projecting into the recesses for supporting the substructure shall be constructed and embedded in the original masonry as indicated on sheet 40/16.

(c) The large beams with plates attached shall be set in place and temporarily supported on the brackets, after which the racks shall be permanently attached. This assembly shall be accurately aligned and adjusted for operation of the gate and permanently attached to the brackets by drilling and bolting. The small grillage beams shall then be bolted to the lower flanges of the large beams and the reinforcing rods arranged and connected. For the final concreting operation the forms shall be placed in short sections and concrete of the same proportions as used in the [fol. 272] original masonry shall be continuously and very carefully placed and thoroughly spaded and rodded to insure a dense, well-bonded backing to properly distribute the loads imposed by the gate.

13-05. (d) Guard rails shall be provided on the upper sides of the gate recesses in the piers to prevent the rack and pinion teeth from being disengaged by drift or other cause during operation of the gate. The rails shall extend from the center of the drum in normal position to the center of the drum when raised to its highest position. The guard-rail structures shall consist of heavy plates, riveted between angles and attached to the masonry by stainless steel anchor bolts and nuts. The guard rails shall be aligned with the caststeel rolling track attached to the drum and before grouting in, shall be adjusted to provide ½-inch clearance between the rail and the track when the gate is in any position.

13-06. Hoisting Mechanism.—(a) Each gate shall be operated from one end only by a hoist consisting of a train of herringbone gears driven by an electric motor direct-connected to a worm-gear speed reducer. The hoists shall be designed to raise the gates with a vertical travel of 9 inches in one minute. From the hoist, a sprocket chain shall be connected to the drum, the chain being suspended in a recess in the pier on a rack between the girders of the hoist as the drum is raised. The general assembly and dimensions of the hoist and the method of racking the chain are indicated on sheet 47/2 and the arrangement of the chain and its attachment to the drum are indicated on sheet 47/1. The hoist and chain shall have a rated capacity not less than the maximum calculated chain pull under uniform normal operating conditions.

(b) Traveling-nut limit switches shall be provided on each hoist to prevent over-travel of the gate at either end of the travel. The hoist shall also be provided with a suitable bracket arranged to engage a cast-steel hook attached to the drum when the gate is in a raised position. It shall be designed to suspend the gate and relieve the lifting chain of its entire load. A suitable device shall be provided on each hoist for indicating at all times the vertical position of the gate with reference to the sill.

(c) All herringbone gears for each hoist shall be made of cast steel with teeth machine cut by the generating process, except that with the approval of the contracting officer, welded forged and rolled steel construction, Lukenweld, Inc., or equal, may be substituted for the cast-steel construction, in which case the welding shall conform to paragraph 4-43 and the teeth shall be machine cut and integral with the rims. Pinions and shafts shall be forged steel. (See paragraph 13-09 below.)

(d) The overall efficiency of the worm-gear speed-reduc- [fol. 273] ing units shall be such that the machinery will not overhaul. The worm wheel shall be suitably shrouded with phosphor bronze and the worm shall be of hardened forged steel with the threads ground. Ball thrust bearings shall be provided on each side of the worm to take the end thrust. The speed reducer shall be suitably connected to the motor by an approved flexible coupling.

13-06. (e) The hoist shall be mounted on cast-steel base plates at each end of the two girders. A recess shall be left in the original masonry and four adjustable anchor bolts embedded therein for each of the base plates which shall be grouted in place. Lead washers shall be provided for the anchor bolts, between the bottom adjusting nuts and the base plates, to insure uniform bearing on the concrete.

13-07. Motors, Brakes and Control.—(a) The hoist motors shall be of the slip-ring induction type, rated one hour 50° C. rise, and wound for operation on 60-cycle, 3-phase, 440-volt, alternating current. They shall be built on N. E. M. A. standardized frames and shall conform in every way to the standardizations of the A. I. E. E. and N. E. M. A. Interchangeable ball bearings shall be furnished in dust-proof housings so installed that either end bracket may be removed without exposing the ball bearings. Two lubricat-

ing connections shall be provided, located horizontally 180° apart. The frames, end brackets and terminal boxes shall be refined gray-iron castings, the feet being cast integral with the frame, or equally rugged construction. All bolts, screws and other steel parts shall be "Parkerized" or similarly treated to prevent corrosion. All windings shall have Class A insulation, thoroughly impregnated with a moisture and oil-proof insulating varnish. Slip rings shall be of bronze, shrunk on the shaft and insulated with mica.

(b) Each hoist shall be provided with a brake similar and equal to the Cutler Hammer Bulletin 507, torque motor-operated, spring-set brake. The brake shall be installed between the motor and the speed reducer and shall be arranged so that the motor may be removed without interfering with the operation of the brake. The brake drum shall be amply proportioned and the brake shall have sufficient capacity to hold the gate securely in any position of its travel. All windings shall be moisture and oil-proof insulated.

(c) The motors shall be provided with standard magnetic type, remote push-botton control, designed for the voltage specified above. The contractors, relays and resistors shall be properly wired and mounted in a steel cabinet located in the downstream end of the operating houses as indicated on sheet 47/2. The push buttons shall be mounted on panels on the upstream ends of the hoists convenient to the entrance doors of the houses. The control shall provide inverse time limit, instantaneous over-load protection and no-
[fol. 274] voltage protection. The resistors shall be of the flat-ribbon, non-corrosive metal type, mounted on suitable supporting frames. The contactors shall be liberally proportioned for the current and voltage on which they will be operated. They shall be quick, positive, and quiet in operation. All contacts shall be silver faced, easily accessible for repairs and replacement, and removable. Effective means shall be provided to extinguish the arc formed between contact tips. The operating coils shall be moisture and oil-proof insulated. All ferrous parts shall be galvanized or similarly treated to prevent rust. All pins and fittings shall be of bronze. All control panel wiring shall be insulated similar or equal to the Table B insulation of the Rockbestos Products Corporation.

13-07. (d) Limit Switch.—The limit switches shall be of the traveling nut type driven by direct gearing to the hoisting mechanism. Parts of the limit switches, such as bolts, nuts, screws and washers, shall be of brass or bronze. The lead-screw shall be of manganese bronze. All iron and steel parts shall be heavily galvanized, sherardized or cadmium coated. The casings shall be given two coats of moisture and oil-proof paint inside and outside. All switches shall be of the quick-make and quick-break type and close with a wiping motion between the contact surfaces that close the electric circuit. All contact surfaces shall be plated heavily with silver. The switches shall be furnished with suitable terminals to provide for the necessary external connections. All limit switches shall be insulated for 500 volts A. C. All insulating parts shall be thoroughly dried and impregnated with a compound to render them entirely non-hygroscopic. The insulation of all parts shall stand a test pressure of 2,000 volts A. C. for five minutes and shall have a resistance of at least one megohm before and after the voltage test has been applied.

13-08. Submergible Gate.—(a) Gate No. 4, located as indicated on sheet 40/0, shall be of the submergible type, capable of being lowered five feet below normal position. It shall compare in general to the views shown on sheet 47/3.

(b) The dimensions, lateral and transverse bracing, and plating shall be similar to those for the regular gates except that members shall be increased where necessary to withstand the additional loading imposed when the gate is in the submerged position. The apron shall also be dimensioned, attached, braced and plated similar to that of the regular gate, except that a hinged extension, fitted with a rubber seal strip, shall be connected to the bottom of the apron to provide an adjustable water-seal.

(c) The hinged extension shall be a heavy continuous steel plate. The hinge shall be amply proportioned and made of an approved corrosion-resisting metal equipped with a suitable sealing strip. The water-seal between the [fol. 275] hinged extension and the sill plate liner shall be made of molded rubber with fabric reinforcement. The rubber seal shall be guarded in an approved manner against damage by drift. It shall be firmly fastened to the apron by stainless steel bolts with continuous metal bearing strips

under the bolt heads or by other suitable arrangement so that the rubber will not tear. The arrangement shall be such that the seal can be readily removed and replaced.

13-08. (d) The hinged extension shall be supported and adjusted by means of structural steel struts pinned to the extension and extending vertically into the drum. The upper ends of the struts shall be fitted with a threaded extension, suitable coil springs and lock and adjusting nuts located convenient to the walkway, the whole supported in an approved manner. Sufficient struts shall be provided to maintain the rubber water-seal of the hinged extension of the apron in close and water-tight contact at any position on the sill liner plate. The downward spring thrust of the struts shall be suitably stopped to limit the position of the rubber seal when the gate is submerged to such a point that the seal passes below the liner plate.

(e) An alternative design of a flexible bottom seal as indicated on sheet No. 47/3 may be substituted for the hinged extension described in (c) and (d) above.

(f) The side seals shall lower into the recess provided in the sill when the gate is submerged. Rubber seals similar to that on the apron shall be attached to the seal plate, both across the width of this recess and along the width of the plate. The entire seal arrangement shall provide a continuous seal, both vertically and horizontally, which shall be in water-tight contact with the respective liner plates for all positions of submergence.

(g) The liner plates embedded in the sill shall consist of curved stainless-steel plates attached to reinforcing members and bracing of structural steel. They shall be constructed and supported in place as indicated on sheet 40/21. A recess shall be left in the original sill concrete and the seal plate adjusted and concreted in after the gate has been finally erected in place.

(h) Provision shall be made for supporting the gate and relieving the lifting chain of its entire load, both when in normal position and when fully submerged.

13-09. Materials, Minimum Metal Thicknesses and Working Stresses.—(a) Unless otherwise specified or required, all metal work shall be of structural steel and all materials and workmanship shall conform to the requirements under

[fol. 276] Section IV hereof. Materials not specifically mentioned shall conform to the requirements of the Standard Specifications of the American Society for Testing Materials where applicable.

13-09. (b) The cast-steel and forged-steel herringbone gears and forged-steel pinions and shafts of the hoists shall conform to the Standard Specifications of the American Society for Testing Materials as follows:

Steel Castings, serial designation A27-24, Class "B", "Hard" grade.

Carbon Steel and Alloy Steel Forgings, serial designation A18-30, Class "C".

(c) The physical properties of the steel in all parts of the sprocket chains shall be in conformity with the following:

Tensile strength, Not less than 85,000 lbs. per sq. in.
Elongation in 2 inches, 18 per cent.

(d) The minimum thickness of metal in any part of the gates shall be ⅜ inch, except the end water-seal diaphragms and the web plates of the segment girders of the transverse bracing of the drums, which shall be 5/16 inch.

(e) The maximum working stresses for structural steel in the drums and aprons shall be 14,000 pounds per square inch for normal loading. The sprocket chain shall be designed for a factor of safety of not less than six, and the various parts of the hoist not less than five.

13-10. Design and Drawings.—The gates and hoists shall be designed according to the best standard practice. The design shall be based on that of actual installations of roller gates of similar size. All parts shall be fully detailed. Prints showing all details shall be submitted to the contracting officer for approval. Suitable space shall be left on each print in which the contracting officer may indicate the action taken. The contractor shall not proceed with the fabrication or manufacture of any part until the corresponding drawings have been approved. After fabrication and installation and prior to final payment, drawings in triplicate, showing complete details of the gates and operating machinery as actually fabricated and installed shall also be furnished the contracting officer. All drawings shall be neatly and legibly prepared and shall clearly present all

details, including assumed loading conditions and stress analyses necessary for thorough checking and proper understanding of the work to be performed. Drawings shall be approximately 27 inches by 40 inches outside dimensions.

[fol. 277] 13-11. Workmanship.—(a) All parts of the complete gates and operating machinery shall be fabricated and erected in accordance with the best modern, approved, standard practice. The drum shall be erected in place within a tolerance of ¼ inch in diameter and overall length and the hoist girders, pier armatures and sill beams within 1/16 inch of the dimensions and elevations as indicated on the drawings. The circumference of the drums shall conform exactly to the dimensions indicated.

(b) All plates for the drum shells, aprons and load discs shall be machined on all edges for tight butt joints. All longitudinal and circumferential joints shall be made with double butt-straps and shall be calked in the field for watertightness where necessary. All rivet holes shall be reamed.

(c) The exposed contact faces of the embedded substructures in the piers, the bases of the case steel racks and spur rims, and the faces of adjoining sections, shall be accurately machined. All bolt holes shall be reamed and the bolts fitted.

(d) No welding, burning or torch-cutting of metal shall be done except by special permission of the contracting officer.

13-12. Shop Erection.—(a) Each gate shall be completely assembled and carefully drilled, bolted and clearly match-marked in the shop.

(b) Each embedded substructure rack and spur rim shall be assembled, fitted and match-marked in the shop.

13-13. Field Erection.—(a) All gates shall be erected complete within the cofferdam. The brackets for supporting the embedded substructures and anchor bolts for the sill beams and hoist-girder base plates shall be embedded in the original masonry and all recesses left as indicated on the drawings.

(b) Each gate shall be completely erected and installed in place and the whole assembly, including the hoist, embedded substructures, racks and rims, guard rails, pier armatures, water seals and sill beam or plate, shall be ad-

justed to an exact fit before the fixed metal is concreted in position. The entire method of assembly and erection shall be subject to the approval of the contracting officer.

13-14. Tests and Trials.—After erection and before the cofferdam is removed, each gate shall be tested by raising and lowering it fourteen times throughout its complete travel. Any defect or misalignment discovered during this test shall be promptly corrected by the contractor and a satisfactory test completed. After removal of the cofferdam, each gate shall again be successfully raised and low-
[fol. 278] ered once through its complete travel. Any defective parts, materials or workmanship, or any material leakage through any gate which may develop at any time throughout the contract period and duration of the guarantee, shall be replaced or corrected at the contractor's expense.

13-15. Spare Parts.—The contractor shall furnish with the five complete gates the following spare parts:

6 chain links (2 long pins and 5 short pins).
1 complete set of gears.
1 motor and brake.
1 complete limit switch assembly.
1 complete rack and spur rim for regular gate.
1 " " " " " " submergible gate.

13-16. Painting.—All metal parts shall be painted as specified in paragraphs 4-45 and 4-46 except that the motors and other electrical equipment shall be painted in accordance with the manufacturers' standard practice. The rollers and other exposed parts shall receive one shop coat of red lead paint and two field coats of aluminum paint. All other metal shall receive two shop coats and one field coat of red lead paint.

13-17. Payments.—(a) The five gates are to be designed, fabricated, erected and painted complete and ready to operate under the lump-sum bid for "Roller Gates." The following parts shall be included under this item:

1. Rollers—drums and aprons.

2. Hoisting mechanism complete with motors, chains and electrical control wired from the fuse side of safety switches.

3. Racks, spur-rims, guard rails, and embedded substructures except the brackets.

4. Pier armatures and end water seals, including watertight junction boxes for heating elements.

5. Sill beams and plate with bottom water seals.

6. Spare parts as listed in par. 13-15 above.

7. Patterns for all castings (see par. 4-01).

[fol. 279] 13-17. (b) Monthly payments under this item will be made on the basis of the following schedule of percentages of the contract price for each gate, when the various parts of the work listed have been completed as indicated:

	Fabricated %	Delivered %	Erected %
Complete drum and apron, including all moving parts of gate	23.00	7.50	24.50
Embedded substructures, including racks, guard rails, sill beams and liner plates	5.00	2.50	7.00
Hoist—complete with motor and control	16.00	3.50	3.00
Lifting chain	6.00	1.50	0.50
Totals	50.00	15.00	35.00

13-18. Guaranty.—The contractor shall guarantee the complete work under this item against defective materials and workmanship and improper design in any part for a period of one year from date of final acceptance, and any part of the work proving defective or of improper design within that time shall be promptly replaced or remedied at the expense of the contractor and to the satisfaction of the contracting officer.

Section ~~XIV~~—Service Bridge

14-01. General.—A steel deck-truss bridge, composed of five spans each one hundred and eight feet long, shall be erected along the upstream side of the dam as shown on the plans. A track with a gage of fifteen feet shall be provided on the deck for the operation of an electric locomotive crane for handling drift. At the bottom chord of each truss there

shall be provided a runway girder with rails for the operation of an electric bridge-crane unit for handling the emergency bulkhead units. The structure shall be erected complete as indicated on the drawings, with all parts in place.

14-02. Drawings to be furnished.—The contractor shall furnish, in triplicate, for the approval of the contracting officer, the following drawings:

Detail shop drawings for fabrication.

Match-marking diagrams for erection.

[fol. 280] Details of erection falsework with arrangement for camber blocking.

14-03. Camber shall be provided in each truss, equal to the deflection produced by the dead load, including one bulkhead unit, plus the weight of the unloaded cranes.

14-04. Metal Work shall be in conformity with Section IV, and as further specified below:

Trusses, and all field connections of crane runway girders and of other members to trusses, shall be subpunched and reamed. The reaming of all field connections of trusses shall be done with members assembled in cambered position.

14-05. Timber Work.—All timber work shall conform with the requirements of paragraph 2-03. The deck floor and side walk shall be of two-inch by twelve-inch timbers, arranged and attached as indicated on the plans.

14-06. Painting shall be in conformity with the requirements of paragraphs 4-45 and 4-46. All metal work shall receive one shop coat of red lead paint and two field coats of aluminum paint.

14-07. Payment for the service bridge will be made at the contract unit prices for the various materials used.

Section XV—Dam Operating Houses

15-01. General.—A reinforced concrete building, to house the operating machinery for the roller-gates, shall be constructed on the top of each pier as indicated on sheets 41/1 to 4, inclusive.

15-02. Walls.—The walls shall be of Class A, reinforced concrete, as specified in Section III. The special form lin-

ing specified in paragraph 3-16(e) shall be used to insure wall surfaces of dense, even, smooth texture.

15-03. Roof Support.—The supporting metal frame work for the roof shall conform with the requirements of Section IV.

15-04. Roof.—The base of the roof shall be of sawdust concrete as specified in paragraph 3-21. It shall be supported by a frame work of steel trusses, purlins, rafters and corrugated metal arches, as indicated on the drawings. The roof covering shall be of tile, as specified in paragraph 6-11. The tiles shall be laid on an approved asphalt roofing felt as specified in paragraph 6-12, and shall be securely nailed [fol. 281] to the sawdust concrete base with 2-inch copper roofing nails. All flashing as indicated on the drawings or otherwise required shall be of No. 20-gage, cold-rolled copper.

15-05. Gutters.—All gutters, including the connections to the cast iron downspouts, shall be constructed as shown on the drawings, and shall be made of No. 20 B. & S. gage, cold-rolled, copper. All seams shall be made with a single-lock seal, sweat soldered. Hooded expansion joints shall be provided at the high points in the gutters. The gutter shall be flashed back onto the concrete base for a distance of at least 6 inches from the ends of the tiles, and into the channel in the top of the wall. All flashing shall be fixed in place with metal wedges. The flashing in the channel shall be sealed in with an asphaltic compound, poured hot.

15-06. Downspouts.—All downspouts shall be of 3-inch cast iron pipe. The gutter connections shall project into the bell end of the pipe and the joint calked with oakum and sealed with bituminous cement. They shall be anchored to the walls and provided with the curved fittings as indicated on the drawings. The downspouts shall be connected to outlets provided in the piers.

15-07. Doors and Trim.—The doors, frames and hollow metal trim shall be constructed as indicated on the drawings and shall be of a standard pattern: "Lupton's" industrial type, or equal. The doors shall have tubular stiles and rails of No. 14 U. S. Standard gage steel with No. 14 U. S. Standard gage steel panels in the lower portion and glazed steel sash in the upper portion. The frames shall

be of No. 12 gage steel securely anchored to the masonry and reinforced at the hinge points as indicated. Each door shall be fitted with brass hinges, cylinder locks and knob latches. The hollow metal trim shall be of No. 18 gage metal and attached with screws and clips. When anchored in place, all frames shall be plumb and square and the doors shall fit perfectly. Cast bronze thresholds, of the size and type indicatd on the drawings, shall be provided for each door, and securely anchored and grouted into place. The hardware shall conform with the Federal Specifications for Builders Hardware F. F.-H-101, finish US4, and of the type indicated on the drawings.

15-08. Windows.—The steel sash windows shall be of a standard pattern: "Lupton's" or equal. They shall be grouted into place as indicated on the drawings. Ventilators, with push-bar operators, shall be provided where shown.

15-09. Glazing.—All sash shall be glazed with clear sheet glass as specified in paragraph 6-08. All glass shall be accurately fitted and throughly puttied.

15-10. Recess Cover Plates.—The recesses in the floor [fol. 282] shall be covered with steel plates as indicated on the drawings.

15-11. Painting.—All exposed metal work, including doors and windows, shall be painted as specified in paragraphs 4-45 and 4-46.

15-12. Electrical Work.—A complete illumination system shall be provided as specified under Section XIX.

15-13. Payment.—Payment will be made at the contract price for each operating house, which shall include all masonry and metal work in the walls and roof of the complete structure above the top of the pier at elevation 659.0. The contract price for the operating houses will include the conduit for the illumination system but will not include any other electrical work for which payment will be made under the item "Electrical Work."

Section XVI—Dam Emergency Bulkhead

16-01. General.—The emergency bulkhead shall be composed of 7 units, constructed of nickel steel as indicated on

sheets 58/1 to 58/5, inclusive. Each unit shall consist of 2 trusses approximately 104 feet in length, connected by lateral and transverse bracing and plated on one side to form a section of bulkhead approximately 4 feet deep. They are designed to fit into recesses provided in the piers, and, when not in use, shall be stored on the left bank of the river as indicated on sheets 40/23 and 53/12 and under Section XXII.

16-02. Metal Work shall be in conformity with the requirements of Section IV.

16-03. Timber Water Seals shall be of white oak in conformity with the requirements of paragraph 2-03(d).

16-04. Painting shall be in conformity with the requirements of paragraphs 4-45 and 4-46. All metal work shall receive 1 shop coat of red lead paint and 2 field coats of aluminum paint.

16-05. Payment will be made at the contract unit prices for the various materials used.

Section XVII—Revolving Locomotive Crane

17-01. General.—There shall be provided under this item a full-revolving, electric, locomotive-type crane, equipped with a 50-foot boom, for operation on a 15-foot-gage track on the deck of the service bridge, as indicated generally on sheet 53/1. It shall be designed in all its parts to with- [fol. 283] stand the rated loading stress with a factor of safety of five, based on the ultimate strength of the materials. All materials shall conform to the requirements of Section IV wherever applicable. The contractor shall submit, for the approval of the contracting officer, the following information concerning the crane which he proposes to furnish:

Name of the manufacturer.

Diagram showing location of center of gravity vertically for the various radii when handling rated loads, and without loads.

Total operating weight without load.

Wheel loads and reactions under all maximum conditions of loading.

Rope diagram showing sizes of ropes and diameters of sheaves and drums.

Number of motors and H.P. of each.
Manufacturer's guarantee.

17-02. Rated Lifting Capacities.—The rated lifting capacities, based on seventy-five per cent of the tipping load at the various radii, shall not be less than the following:

Radius of 15 feet	60,000 pounds
Radius of 20 feet	42,000 pounds
Radius of 25 feet	30,000 pounds
Radius of 30 feet	23,000 pounds
Radius of 35 feet	19,500 pounds
Radius of 40 feet	17,000 pounds
Radius of 45 feet	15,000 pounds

17-03. Operating Weight—Wheel Loads.—The total operating weight, without load, shall not exceed 105,000 pounds. The maximum single wheel load shall not exceed 37,000 pounds under rated loading conditions.

17-04. Car Body and Safety Rail Connections.—The car body shall be of structural steel securely riveted and braced, with ample provision for the rigid mounting of the rotating gear. It shall have an over-all width of not more than 17 feet and shall be of sufficient length to provide for the attachment of a four-roller safety-rail connection at each corner. Each safety idler device shall be of sufficient strength to withstand an uplift of 10,000 pounds and shall be constructed in general as shown on sheet No. 53/8.

[fol. 284] 17-05. Trucks.—The car body shall be mounted on four 2-wheel equalizing trucks. The trucks shall be fifteen feet between centers and shall not be equipped with springs. The wheels shall be of cast steel, double-flanged and turned for 80-pound A. R. A. rails. Truck journal bearings shall be bronze, renewable sleeve type.

17-06. Travel Mechanism.—Travel shall be independent of other operations and at a variable speed from 150 to 350 feet per minute. Drive from the motor shall be to all eight wheels by means of suitable steel, spur gears and chain reduction, the chains to have finished, steel rollers. The travel mechanism shall provide a drawbar pull of approximately 1,500 pounds at a travel speed of 350 feet per minute.

17-07. Hoisting.—(a) There shall be three hoisting drums and a worm-gear boom hoist, providing for the following lines:

(1) Main hoisting line with single line pull of 15,000 pounds at 140 feet per minute, for operation of a wood grapple.

(2) Auxiliary hoisting or towing line with single line pull of 15,000 pounds at 140 feet per minute, for operation through swivel fair leader at foot of boom or as a block and fall line.

(3) Holding line for wood grapple, with single line pull of 15,000 pounds at 140 feet per minute.

(4) Boom hoist line.

(b) All drums shall be of cast steel or nickel iron thoroughly annealed, with annealed cast-steel, split, removable shells. The pitch diameters shall not be less than thirty times the diameter of the cables. The main hoisting and holding line drums shall have sufficient width and flange to provide for 2-part lines reaching eighty feet below the track rails with boom in the highest position. The auxiliary or towing line drum shall provide for a 6-part line reaching eighty feet below the track. All drum shafts shall be solid nickel-steel, ground to size, and splined for clutch driving members. One-piece, annealed-steel castings shall be used for drum side housings to support the shafts and rotating shaft bearing in a rigid unit, accurately mounted and securely bolted to machined surfaces on the rotating base casting. All friction-clutch and drum-brake surfaces shall be machined and polished. A self-locking type, worm-gear boom hoist, with automatic safety holding brake, shall be provided for power raising and lowering of boom. The worm and gear shall operate in oil and shall be fully inclosed in an oil-tight housing. All driving gears for the drum shafts shall revolve between ~~two~~ heavy bearings designed to provide the greatest possible rigidity.

[fol. 285] 17-08. (a) Rotation shall be at a speed of approximately two and one-half revolutions per minute with full load on the 50-foot boom at a 45-foot radius.

(b) The rotating gear on the turn-table shall be firmly mounted on the car-body structure to resist compression

strains and prevent misalignment of the center pin or center gudgeon with relation to the roller path and rotating pinion. The roller path shall be of a diameter to bring the center of gravity close in to the center of rotation, but this diameter shall not be less than 7 feet. With this construction, the rotating gear shall be of one piece, cast integral with the roller-path and center-pin bearing. The upper rotating base shall then be secured to the lower frame by means of an adjustable center pin not less than 11 inches finished diameter and supported by not less than six beveled rotating rollers of steel, machine finished, and equipped with thrust washers. The forged center pin and the rotating rollers shall be of 0.20-0.30 per cent carbon steel.

(c) The upper rotating base shall be a one piece, open-hearth, annealed-steel casting, without structural extensions, for carrying the hoisting and rotating machinery, together with the main motor drive. The upper base casting shall be of amply heavy section to secure proportionate weight for size without addition of ballast, and all machinery weight mounted thereon shall be arranged to eliminate excessive counterweight. Machinery placement must be equidistant from the sides for equal rotating roller pressure when rotating.

17-09. Motors.—The main motor or motors for hoisting and rotating shall be of the open crane-and-hoist type, rated continuous with a temperature rise of 40° C. They shall be built on N. E. M. A. standardized frames and shall conform in every way to the standards of the A. I. E. E. and N. E. M. A. Interchangeable ball bearings shall be furnished in dust-proof housings so installed that either end bracket may be removed without exposing the ball bearings. Two lubricating connections shall be provided, located 180° apart. The frames, brackets and terminal boxes shall be of refined gray-iron castings, the feet being cast integral with the frame. All bolts, screws and other steel parts shall be "Parkerized" or similarly treated to prevent corrosion. All windings shall have Class "A" insulation, thoroughly impregnated with a moisture and oil-proof insulating varnish. Starting equipment shall be a dry-type, reduced-voltage starter providing overload and under-voltage protection, with an additional "Stop" button located convenient to operator's control levers. The power

plant shall be designed for operation on 3-phase, 60-cycle, 440-volt, alternating current.

[fol. 286] 17-10. The travel motor shall be of the open crane-and-hoist type, of similar construction as specified above for the main motor. It shall be capable of delivering full rated load for thirty minutes with a temperature rise not to exceed 50° C. in an ambient temperature of 40° C. A motor-mounted, spring-set, torque-motor-operated shoe brake shall be provided, with one drift point in either direction. Control shall be of the reversing-drum type, and in addition a line contactor shall be provided to give overload and under-voltage protection. Motor and control shall be designed for operation on 3-phase, 60-cycle, 440-volt alternating current.

17-11. Clutches.—Hoisting and rotation motions shall be through friction clutches of the band type, driven from main motor through suitable silent-chain drive reduction with total loss of efficiency from motor to clutch shaft of not more than three per cent. The hoisting clutches shall be of the band type and the mechanism shall be of such design, construction and workmanship that engagement and disengagement may be accomplished with ease direct from the operator's hand lever and, if auxiliary clutch or other serve means is used, the design shall be such that the operating lever is directly connected so that the operator will have full control to slip the clutches. All clutches shall be lined with an approved make of formed blocks not over ¾ inch thick, held in place on the band by means of keepers for ready removal or replacement without removing the complete band. The lining shall have a coefficient of friction of not less than 0.4. All clutch parts shall be of cast steel, thoroughly annealed, and clutch-driving member and shaft shall be machined and broached for splines. No keyways shall be used. The rotating friction clutches shall have shells of cast steel or nickel iron, thoroughly annealed, machined and polished. The rotating clutch shafts shall be of nickel steel, heat treated, ground to size and splined for clutch-driving member.

17-12. Brakes.—Hoisting drum brakes shall have approved, readily-removable lining with a coefficient of friction of not less than 0.4. They shall be amply heavy for severe hoisting duty and the operating mechanism shall be

designed to insure the greatest possible safety at all times. A positive, foot-operated rotating lock shall be provided to keep the upper frame of the crane in a fixed position while traveling or standing idle.

17-13. Gears—Shafts—Bearings.—(a) All gears shall be of steel, and, except the travel gears, shall have machine-cut teeth. Cut-tooth pinions of twenty teeth or fewer shall be of chrome-nickel steel, heat treated, and shall be cut from solid stock.

(b) All cut gears and pinions shall have diametrical-pitch, standard stub teeth.

[fol. 287] 17-13. (c) Travel gears in the lower frame and the large rotating gear ring shall be thoroughly annealed cast steel with accurately moulded teeth, ground to size.

(d) All shafts on the upper rotating base shall be nickel steel, ground to size.

(e) All shafts in the car body shall be of forged steel except shafts less than 3½ inches in diameter which may be of cold-rolled or drawn steel.

(f) Bearings shall be of ample size to insure cool running, They shall be fitted with removable, sleeve-type, crane, bronze bushings with thrust collars and be provided with suitable oil grooves.

(g) Convenient and efficient means shall be provided to take up bearings for wear and for removal of the sleeve bushings.

(h) All bearings shall be provided with an efficient and readily accessible system of pressure lubrication.

17-14. Boom.—The boom shall be 50 feet long from hinge-pin center to center of head shaft, and shall be constructed of four heavy, latticed chord angles, securely trussed together, and pivotly connected to the rotating base casting. The chord angles shall be bent to a parabolic curve to give the boom greatest possible strength with minimum weight and to relieve the lacing as far as possible from compression strains. Both horizontal and vertical bracing shall be of angles. The boom shall be fitted with heavy, machine-grooved, bronze-bushed pressure-lubricated cast-steel main sheaves not less than twenty times the diameter of the

cables. Boom-head shaft shall be extended on each side for carrying the boom-hoist sheaves which shall be securely locked in place. An idle sheave and connections shall be provided for the threading of a block-and-fall line with the auxiliary hoisting or towing line.

17-15. Cab.—(a) The cab shall be of all-steel construction, sides and roof amply braced and supported, and provided with at least 100 square feet total of all-sliding windows and doors. It shall be weather-tight and house all machinery and be large enough to accommodate the operator and machinery without crowding. All machinery shall be accessible for inspection, lubrication and repair. The operator's position shall be to the extreme front end of the cab and shall have unobstructed view from the cab on three sides, and provision made for unobstructed view of the work above or below the track with the boom at any elevation. All operations shall be controlled by one operator, and all levers shall be within reach without moving from the operator's position. The clutch levers and foot-brake pedals shall be grouped in a convenient manner in a banked [fol. 288] quadrant, and travel-motor-drum controller shall be placed adjacent to the operating levers. Push-button control for the main motor shall also be located within easy reach of the operator. The over-all width of the cab shall not be more than eleven feet and the tail-swing radius shall not exceed fifteen feet. The clearance of the lowest point on the rotating base above the top of rails shall be not less than three feet eight inches.

17-15. (b) Two 115-volt, 500-watt searchlights, pre-focused for an eighteen degree beam spread, shall be provided and mounted, complete for operation, on top of the cab at the front end. The lights shall be similar and equal to the type "DCX-14" manufactured by the Crouse-Hinds Company. They shall be arranged for remote control from the operator's stand and when mounted, shall not exceed a height of 24 inches above the cab roof.

17-16. Electric Power will be 3-phase, 60-cycle, 440-volt, alternating current. The crane shall be provided with a collector trolley designed to fit the conductor system as indicated on sheets 53/6 and 56/4. All wiring shall be in metal conduits and shall be of "Rockbestos" cable or equal. A master switchboard shall be provided in an easily acces-

sible location within the cab, and the main motor control shall be mounted thereon.

17-17. Wood Grapple.—There shall be provided with the crane a rope-reeved, wood grapple for under-water operation on the main hoisting line. It shall have an area of approximately eight square feet within closed arms. Each arm shall have four forged steel arms connected with extra heavy steel plates. All sheaves shall be machine grooved and ample provision shall be made for the lubrication of all moving parts. It shall be of extra heavy construction throughout, designed to operate under maximum load conditions.

17-18. Painting.—All parts of the crane, including exterior and interior surfaces, and the machinery, shall be given 1 shop coat of red lead paint and two coats of aluminum paint as specified for the service bridge in paragraphs 4-45 and 4-46. The third and final coat of the paint shall be applied in the field, immediately prior to final acceptance.

17-19. Erection and Trials.—The crane shall be completely erected in place upon the service bridge. A temporary connection shall be made to the power conductor system and the crane shall be subjected to sufficient trial operation to demonstrate to the satisfaction of the contracting officer that it conforms with the requirements of these specifications. It shall also be tested at various radii with overloads up to twenty-five per cent of its rated capacity. Any defect in the materials or failure in performance discovered during the trials shall be immediately remedied at the expense of the contractor.

[fol. 289] 17-20. Payment will be made at the contract price for "Revolving Locomotive Crane—Electric," after erection and successful completion of the trials and tests. The contract price shall include the cost of erection and trials and all incidental costs thereto.

Section XVIII—Bridge Crane Unit

18-01. General.—The unit to be provided for the handling of the emergency bulkhead units shall consist of two 15-ton, electrically-operated bridge cranes connected in tandem as indicated generally on sheet 53X1.

18-02. Bridge Connection.—The connection shall be a light through-truss footbridge. It shall consist of two structural steel trusses approximately four feet deep and spaced four feet apart. The floor shall be of creosoted timber, approximately four feet wide and provided with 6-inch toeboards. The bridge shall be of such length that the crane hooks in their highest position will be 40 feet 6 inches apart. No part of the entire connection shall be below the bottom of [redacted]rane beams, and it shall be of sufficient strength to carry [redacted] dead load of the control devices plus a live load of 500 pounds concentrated in the center of the span.

18-03. Cranes.—The two bridge cranes shall be of the 3-motor type, similar and equal to the "Conco" cranes manufactured by the H. D. Conkey & Company. All gearing shall be inclosed and run in oil, and gear and pinion shafts shall be provided with roller bearings. Each crane shall be provided with a hook which will fit the lifting connection on the bulkhead units (sheet 58/4), and which shall be especially designed so that it can be disengaged by movement of the cranes after the bulkhead units have been placed under water. In their highest position, the hooks shall be above the bottom of the crane beams. The cranes shall provide all clearances and operating limits as indicated on sheet 53/6 and shall comply with the following requirements:

Capacity, 15 tons rated, plus 25 per cent overload.
Lift, 55 feet.
Span, 13 feet 8 inches (C-C Rails).
Maximum full load speeds:
  Bridge, 150 feet per minute.
  Hoist, 15 feet per minute.
  Trolley, 25 feet per minute.
Power, 3-phase, 60-cycle, 440 volts, A. C.

18-04. Motors.—(a) The motors shall be of the wound-rotor, crane-and-hoist type, wound for operation on 440 volts, 3-phase, 60-cycle. They shall conform in every respect to the latest standardization rules of the A. I. E. E. [fol. 290] and the N. E. M. A., unless otherwise specified.

18.04. (b) The motors shall have a sufficient rated output to perform the duty specified and shall have a service factor of not less than 25 per cent. They shall be rated 30 minutes, 50° C. rise. They shall have a starting torque of not

less than 2¼ times, and a pullout torque of not less than 2½ times full load torque. The frames and end brackets shall be so constructed that rain or snow driven at the motors from any angle will not enter the windings. The windings shall be thoroughly impregnated with a moisture and oil-proof insulating paint.

(c) The frames, end brackets and terminal boxes shall be of heavy, rugged construction, with the feet integral. All screws, bolts, nuts and other steel parts shall be "Parkerized" or similarly treated to prevent rust. Interchangeable ball-bearings shall be furnished, so installed that either end bracket may be removed without exposing the ball bearings. Two greasing connections, located horizontally 180 degrees apart, shall be provided on the bearing housings. The housings shall be designed to prevent dust, grit or any other foreign substance from entering. The windings shall be insulated with Class "A" insulation. Lifting ring shall be provided.

18-05. Control of each motion of each crane shall be provided for from an operating platform in the center of the connecting bridge. Duplex radial drive drum type controllers, "Cutler-Hammer" or equal, shall be used. They shall be thoroughly weather-proof and shall provide adequate speed reduction for all motions of the crane under average load conditions. A shoe type current collector shall be designed to fit the conductor system as indicated on sheet 56/5. The shoes shall be made of bronze and shall be reversible.

18-06. Erection and Trial.—The unit shall be erected in place, complete with all control and wiring. Before acceptance, it shall be given several trial operations, loaded with a bulkhead unit, over the entire length of the runway and shall make several placements and removal of the bulkhead unit in the recesses provided in the piers.

18-07. Painting.—The complete unit, except the electrical equipment, shall be painted as specified for the service bridge in paragraphs 4-45 and 4-46. The motors and other electrical parts shall be painted with weatherproof paint in conformity with the manufacturer's standard practice.

18-08. Payment will be made at the contract price for "Bridge-Crane Unit—Electric," which shall include all parts of the complete unit, including the collector, trolley and shoes, erected in place, tested and ready for operation.

[fol. 291] Section XIX—Electrical Work

All materials, equipment and work specified under this section shall conform to the requirements of Section V where applicable.

19-01. Work required under this section of these specifications consists of the following major items:

(a) Conduit System for both Lock and Dam.
(b) Lock Illumination System and Signal Light Feeders.
(c) Power Distribution System for Dam.
(d) Incoming Power Feeder.
(e) Tow-Haulage Unit Feeders.
(f) Remote Control Station on Locks.

19-02. General.

(a) The schematic layout of the lock and dam power system is as indicated on sheet 29/1. All power is received and distributed at the main switchboard located in the power house.

(b) The switchboard to be provided under Section XII shall be of the free standing cubical construction and shall contain all the equipment for the control of incoming and generated power, control of all feeders, motors in the power house, and the lock signal system. The air-cooled transformers for the lock and dam lighting shall be located in the switchboard inclosure as indicated on sheet 29/2.

(c) A remote control stand shall be provided on the land wall of the locks for the remote control of the two oil-pump motors and the air-signal at the power house, and the lock exterior illumination and signal-light circuits.

19-03. Present Condition of the Work.—The necessary embedded conduit has been installed in the river and intermediate lock walls, and the manhole constructed on the river wall extending the depth of the lock wall. This manhole has been provided with permanent ladders and embedded structural channels for mounting cable supports. These channels are drilled and tapped and cap screws are in place for mounting the cable supports as shown on sheet 29/13. The drilling was made to suit the G. & W. Electric Specialty Company's cable support No. 224. This manhole will normally be full of water up to an elevation equal to

the existing stage of the river. Suitable arrangements for pumping and keeping it dry must be made during the progress of the work. The conduits extending across the lock chambers have been terminated in the Lock "B" chamber face by a suitable construction joint from which extension can be made as required under this contract. The details of this construction joint are indicated on sheet 20/22B. The necessary lock lighting standard bases and junction [fol. 292] boxes have been provided on the river and intermediate wall under previous contract. These items have been installed in the same manner as is required under this contract. The R. & S. junction boxes have been drilled to suit the G. & W. Electric Specialty Company's type "K" junction box.

19-04. Electrical Conduit System.

(a) General.—The contractor shall provide the conduit work specified below, complete and ready for wiring.

(b) Lock "B".—All fibre conduit, junction boxes, lighting and signal standard bases, pull boxes, manhole, and embedded supports, as indicated on sheets 20/20B, 21B, and 22B.

(c) Power House.—The conduit, including the panel board, but excluding the fixtures and wiring for the power house lighting system as indicated on sheets 70/7 and 8. The river wall manhole shall be completed; the cable riser and cable troughs connecting the manhole and switchboard shall be constructed, including all necessary items; and all conduits between the switchboard on cable trough and power house equipment and the dam conduits shall be installed as indicated on sheets 70/9 and 29/13.

(d) Piers on the Dam.—Conduits, junction boxes and fittings in the lock wall abutment and intermediate piers as indicated on sheets 56/1 and 3.

(e) Operating Houses on the Dam.—Electrical conduits, safety switches and control switches, but not the wiring or fixtures, for the lighting system, feeder, motor and heater circuits.

(f) Service Bridge.—The electrical conduits, junction boxes, and switches for the incoming line, power distribu-

tion, lighting feeders and telephone line. The material required and the method of its installation shall be as indicated on sheets 56/2 and 56/3.

(g) Construction Methods.

(1) Fibre conduit runs between the manholes and pull boxes shall be arranged as shown on sheet 20/20B. The conduit shall be rigidly held in place to prevent misalignment when pouring concrete. All joints between the lengths of conduit shall be tightly made and sealed by means of asphalt paint (see paragraph 5-05(j)). When the run of conduit is to be continued through an expansion joint it shall be terminated in an approved manner so the run can be properly continued into the next monolith. Where the conduits enter the manholes, each conduit shall be provided with a [fol. 293] porcelain conduit entrance. Care shall be exercised when pouring the concrete to prevent damage to them, and in no case shall concrete be poured directly on the conduits of the run. All open conduit ends shall be plugged. Immediately after placing the concrete around the ducts, each conduit of the run shall be inspected for continuity and freedom from obstructions, by pulling a smooth, wooden mandrel through each conduit of the run. The mandrel shall be not less than 3 feet long and not more than ⅛ inch less in diameter than the nominal diameter of the conduit. Prior to final acceptance each run of conduit shall be again inspected as specified above.

19-04(g)-(2) Metal Conduits.—All ends of metal conduit shall be reamed to remove all rough edges and all joints and connections between lengths of conduits, switches, boxes and fittings, shall be tightly made so that there will be electrical continuity through a given conduit system. All joints shall be water-tight. All open conduit ends shall be capped during construction to prevent dirt and moisture from entering. Any run of conduit extending through a construction joint shall be extended a sufficient distance past the face of the concrete form on wall, and be provided with proper threads, so that the run can be properly continued in the next wall.

(h) Payment for all conduits, completely installed in place and ready for wiring, will be made at the contract prices per linear foot for the various sizes required, except

for the lighting system conduits in the power house and operating houses, which will be included in the contract lump sum prices for each of those structures. Payment for all metal work required in the system will be made at the contract unit prices for the various items. Payment for the safety switches will be included in the contract lump sum price for "Electric Wiring, Illumination and Control Equipment."

19-05. Lock Exterior Illumination.

(a) General.—The locks shall be illuminated by lighting units as indicated on sheet 29/11, which are to be installed, one row each on the land and river walls and two rows on the intermediate wall. The location of each unit shall be as indicated on sheet 29/5. The contractor shall furnish, install and connect all units ready for operation. The necessary lead covered cables, indicated on sheet 29/5, shall be [fol. 294] installed and connected to each lighting unit and to the proper switches on the power house switchboard, as indicated on the schematic wiring diagram 29/1.

19-05. (b) The standards shall be of tubular steel construction with cast iron bases, conforming to details on sheet 29/11. The entire unit shall be assembled so as to give the luminaire a mounting height of 15 feet measured from the top of the lock wall to the center of the lamp. The material not detailed shall conform to the bill of material listed on sheet 29/12.

(c) Luminaires shall be of the pendant type, similar and equal to the standard product of the Holophane Company, Inc., equipped with "A-SYM-ETRIC" refractors having a distribution curve as indicated on the detail drawing. Each luminaire shall be provided with a 300-watt, 115-volt lamp, but shall be of sufficient rating to allow the use of a 500-watt lamp if necessary.

(d) Connection of each lighting unit to the main lighting feeder shall be made as indicated on sheet 29/11, and in conformity with sheet 29/1. The plug connection between the lamp-standard wiring and the base receptacle shall be water-proof. The lamp standard base shall be completely filled with insulating compound and plugged. The junction box in the main feeder shall be filled with compound to the level of the fuse blocks. The connection between the splice

box and base receptacle shall be lead covered cable designated as CL-24 on sheet 29/5.

(e) Tests.—Each lighting unit shall be tested by means of a "Meger" before applying voltage. The insulation resistance shall be at least 1 megohm. The complete lock lighting system, including the lamps, shall be energized for a continuous period of 12 hours, as a final acceptance test to determine that all splices and contacts are properly made and do not heat.

(f) Painting.—Lamp standards, including bases and brackets, shall be given a shop coat of red lead paint and two field coats of aluminum paint as specified in paragraphs 4-45 and 4-46.

19-06. Lock Signal Light Feeders.

(a) General.—The necessary feeders for the lock signal system, including those for existing Lock "A", shall be provided and installed, complete and ready for connecting the signal and marker light units. The signal light and marker light units will not be provided under this contract. The necessary cables are indicated on sheet 29/5.

(b) Work completed under Previous Contract.—The [fol. 295] necessary conduit and junction boxes for connecting the signal and marker lights on the river and intermediate walls only, have been provided under a previous contract. At each location a cast iron base casting and cover has been provided and embedded in the lock masonry. Each cover has been provided with two Crouse Hinds BRB 8303 plug receptacles. The locations of the base casting are as indicated on sheet 29/5. The necessary conduit, junction boxes and base castings for the signal lights on the land wall of Lock "B" shall be furnished and installed under this contract.

19-06. (c) The cables shall be terminated in the cast iron junction box in the manner shown on sheet 29/12. The conductors shall be connected to the plug receptacles, the cover put in place and the base entirely filled with insulating compound. Each receptacle contact shall be marked with the wiring diagram number of the wire connected to it. These markings shall be die-stamped into the insulating material and filled with white lead. The cables shall be

connected to the proper switches on the main switchboard as indicated on drawings 29/1, 29/3 and 29/4.

(d) Tests.—Each conductor of the cable shall have an insulation resistance to ground and between conductors of not less than 20 megohms. The complete feeder system shall be energized with rated voltage for a continuous period of 12 hours.

19-07. Power House Lighting.—(a) The contractor shall furnish and install complete and ready for operation, a 2-wire, 115-volt, single phase, lighting system, complete, including fixtures, receptacles, switches, fuses and wire, and connect it to the proper switch on the main switchboard. None of this work shall be started until any mechanical or other building work, which is liable to injure the wires, has been completed as far as possible. The method of installation and the necessary material shall be as indicated on sheets 70/7 and 70/8.

(b) Tests.—After the wiring has been installed in the conduit, with all cut-outs and safety devices in place, but before the lamp sockets, receptacles, fixtures and other appliances have been connected, the insulation resistance between conductors and between all conductors and ground shall be not less than 1 megohm. After the lamp sockets, receptacles, fixtures and other appliances have been connected, the insulation resistance shall be not less than .5 megohm. After the installation is complete, all circuits and items of equipment shall be energized for a continuous period of 12 hours, to determine if all splices and contacts and equipment are properly made and of proper rating and do not heat.

19-08. Dam Distribution System.—(a) The contractor shall furnish all material and labor necessary to install [fol. 296] complete and ready for operation the following:

19-08. (b) Operating House Lighting.

(1) A 2-wire, 115-volt, single phase, electrical lighting system shall be installed in each operating house, also the main, 3-wire lighting feeder from the switchboard in the power house to each operating house. The method of installation and wiring shall be as indicated on sheets 29/1, 56/1 and 56/2.

(2) Tests shall be the same as specified under Power House lighting.

(c) Contact Rails for Locomotive and Bridge Cranes.

(1) The contractor shall provide an electric-crane, contact conductor system on the upstream, top cord of the service bridge and another system on the cross braces of the service bridge, including the feeders from the switchboard in the power house, all connected and ready for operation. The method of installation and connection shall be as indicated on sheets 29/1, 56/1, 2, 3, 4, 5 and 6.

(2) Contingent Work.—That portion of the bridge-crane contact rail system indicated on sheet 56/6, including the necessary conduits and feeders shall be subject to the conditions stated in paragraph 2 (c). (See Section XXII.) Payment for this work will be made at the contract lump sum price for "Electrical Work" under "Contingent Items."

(3) Tests.—The insulation resistance to ground of each conductor of the systems shall be not less than 2 megohms. The insulation resistance of each leg of the feeder circuit, before it is connected to the contact rails, shall be not less than 2 megohms. The completed systems shall be energized with rated voltage for a continuous period of 12 hours.

(d) Roller-Gate-Hoist Motor Feeders.

(1) Work under this item shall include the furnishing of all material for installing 2 duplicate feeders for the roller dam hoist motors. The feeders shall be installed complete and ready for operation from the switchboard in power house to the outside terminals of the 200-ampere, double-throw weather-proof safety switch in each pier house.

[fol. 297] 19-08. (d)-(2) Tests.—Each leg of each circuit shall have an insulation resistance of not less than 2 megohms. The completed circuits shall be continuously energized with rated voltage for a period of 12 hours. During the test of the roller gates, each motor shall be started and stopped and allowed to run continuously for 15 minutes at least twice from each circuit.

19-09. Incoming Power Feeder.—(a) The contractor shall furnish and install the necessary cable for the 2 incoming power lines as indicated on sheet 29/1.

(b) One incoming line shall extend from the switchboard to the manhole on the land wall of the lock. The necessary cable for this feeder is designated on sheet 29/5 as CP1. The cable shall be connected to one side of the double-throw disconnected switch in the power house and be terminated in a cast iron water-proof junction box in the manhole. The cable shall enter the junction box through a suitable cable head so as to allow the proper sealing of the lead covered cable. The junction box shall be 2-way, 3-pole, provided with 2 cable heads similar and equal to the type "E" junction box as manufactured by the General Cable Corporation. The cable heads shall be sealed after installation.

(c) The other incoming line shall extend from the disconnecting switch on the switchboard to the 400 ampere safety switch conduit located on the abutment pier of the bridge as indicated on sheet 56/2. The necessary cable shall be as indicated in the bill of material as 56/3.

(d) Tests.—The insulation resistance of the lead covered incoming line cable shall be not less than 50 megohms. It shall be disconnected from the main bus when the reading is made. The insulation resistance of the incoming feeders across the service bridge shall be not less than 10 megohms per leg of the circuit. Both circuits shall be energized with rated voltage for a continuous period of 12 hours.

19-10. Tow-Haulage Unit Feeders.—(a) The contractor shall furnish and install the power cable from the switchboard in the power house to the power plug pull boxes at each unit. The necessary cables are indicated on sheet 29/5. The lead covered cables shall be terminated at each pull box and the power plug installed ready for making necessary connection to each unit. The method of installation shall be as shown on sheet 29/13. The conduits and pull boxes, including the mounting plate which has been drilled and tapped for a Crouse-Hinds AJA61104 power plug, have been provided under a previous contract.

[fol. 298] 19-10. (b) Tests.—The tests for these feeders shall be the same as for the lead covered incoming line feeder, except that each tow-haulage unit shall be operated at least 2 times during the 12-hour period.

19-11. Remote Control Station.—(a) A remote control station shall be provided on the land wall at the location indicated on sheet 29/5. It shall be equipped with the necessary master control switches and wired for controlling the two oil pumps, the air signal in the power house and the lock exterior illumination and signal lights. The details of its construction and installation shall be as indicated on sheets 29/1 and 29/8, 9 and 10. The necessary cable is indicated on sheet 29/5. It shall be painted with one shop coat and one field coat of red lead paint and two field coats of aluminum paint, as specified in paragraphs 4-45 and 4-46.

(b) Tests.—Each conductor and all conductors of the control cable shall have an insulation resistance of not less than 20 megohms to ground. The control switches shall have an insulation resistance to ground of not less than 50 megohms before being connected to the cable. The current shall be energized with rated voltage for a continuous period of 12 hours, during which time each oil pump and the whistle shall be operated not less than 5 times.

19-12. Grounding.—(a) Grounding plate shall be provided in the manhole on the land wall as indicated on sheet 20/21B. The ground plate shall be as shown on sheet 20/22B. The grounding cable, as indicated on sheet 29/5, shall be installed and connected to the grounding plate and oil piping system as indicated on sheet 29/13.

(b) All devices on the dam, power house and lock shall be adequately grounded as indicated on the drawings. All lead covered cables shall be bonded together as indicated and connected to the ground cable.

19-13. Construction Methods.—(a) Pulling in Lead Covered Cables shall be in accordance with the best standard practice. A mandrel shall be run through all existing fibre conduits through which cables are to be drawn and all obstructions removed. The mandrel shall be made of hardwood at least 3 feet long and with a diameter not less than $\frac{1}{8}$ inch less than the nominal diameter of the duct. Grease

shall be applied to the outer surface of the lead sheath for lubrication. The open ends of the cables shall be sealed before pulling them through the conduits. A mesh wire pulling grip shall be laced to the ends of the cables and to the pulling rope.

(b) Cable supports of the flexible band type shall be provided for suporting cables in the risers of the manholes ex- [fol. 299] tending the depth of the lock wall. Supports shall be provided at all 3 points along the height of the manhole risers. All cables shall be installed in the same vertical line and in no case shall a cable cross other cables in the risers.

19-13. (c) Cable Terminators (Potheads).—Potheads of the approved type and filled with insulating compound and joined to the lead sheath of the cable by means of a wiped joint or stuffing box and clamping ring shall be provided for terminating all lead covered cable. Each conductor shall leave the terminator through a separate hole in the terminator cover. The strands of the conductors shall be soldered together into a solid conductor, a sufficient distance above and below the level of the insulating compound so as to prevent water from entering the cable. Each conductor shall extend the required distance from the terminator to allow connections to its respective equipment. This extension shall be thoroughly insulated with tape and shall be given 2 coats of an approved oil and waterproof paint. (See paragraph 5-05(j).) Soldered lugs shall be provided on the ends of each conductor for making the connections.

(d) The potheads for lead covered cables terminating at the switchboard shall be provided with suitable racks for supporting and holding them rigidly in place.

(e) Cable and Conductor Labeling.—The cable number shall be die-stamped, where it will be readily visible, on each cable terminal and on each entrance nipple on the junction box. Each cable shall be labeled at the beginning and at the end of the run and in each intervening manhole through which it passes. These tags shall be of the Electric Service Supplies Company's No. 12413 or equal, and shall have the cable number as shown in the cable tabulation die-stamped on the tag. Each conductor of the cable, where it leaves the pothead, shall be identified by means of a ¾-inch round, horn fibre tag attached to the conductor by means of

a waxed cord. The tag shall carry the number of the cable to which the conductor belongs, also the wiring diagram number of the conductor.

(f) Splices in Lead Covered Cables.

(1) All splices in lead covered cables shall be made with a wiped lead sheath filled with insulating compound. Care shall be taken to keep all materials and tools thoroughly dry and heated to a temperature to prevent condensation. Splices shall conform to best standard practice.

(2) The lead sheath and other insulation shall be carefully cut and removed in such a way as to prevent injury to adjacent insulation or bare conductors.

[fol. 300] 19-13. (f)-(3) The bare conductors shall be carefully cleaned, tinned and butted together, over which a split copper sleeve properly soldered shall be used for connecting all the conductors in the splice.

(4) Each splice shall have a dielectric strength of a greater value than that rated for the cable.

(5) When a cable is opened preparatory to splicing, the work of splicing shall proceed immediately, the work being uninterrupted until the splice is completed. Methods employed and materials shall conform to the best practice. No splices shall be made during damp or inclement weather.

(6) No splices in any cables shall be made in manhole risers or in any conduit.

(7) Splices in Control Cables.—After the conductors have been butted and soldered together by means of copper sleeves, the connections shall be taped with rubber tape and 2 layers of cotton tape, half lapped, and boiled out with an insulating compound, and all conductors bundled together and taped with a rubber-filled tape half lapped. The rubber tape shall have the same properties as the rubber insulating compound of the cable.

(8) Splices in Power Cables.—The connections shall be loosely wrapped with a narrow cotton tape, over which one layer of tape half lapped shall be wrapped the entire distance between the conductor insulation and shall then be boiled out with an insulating compound. An inner paper tube, for each conductor, shall be slipped down so that the

tube is centrally located over the splice. The tube shall be secured by means of a ½-inch cotton tape or flax twine stretched tightly over each tube and tied at each end of the conductor. An outer tube shall then be centered over the inner tube and tied tightly in place in the same manner as specified previously for the inner tube. The ends of the outer and the inner tubes shall be left free of any obstructions, such as tape or paper, to permit the free flow of the insulating compound.

19-14. (a) Payment for all electrical work, except for the contingent work (specified in paragraph 22-02(c)), the switchboard and wiring in the power house (specified under Section XII) and all conduit (see paragraph 19-04) will be made at the contract lump-sum price for "Electrical Wiring, Illumination and Control Equipment."

[fol. 301] 19-14. (b) Monthly estimates for all work completed will be given on the basis of the following schedule of percentages of the contract price:

	Per Cent
1. Lock Exterior Illumination	20
2. Lock Signal Light Feeders	15
3. Power House Lighting	2
4. Incoming Power Feeders	10
5. Tow-Haulage Unit Feeders	6
6. Remote Control Station	6
7. Operating House Lighting	6
8. Roller Gate Hoist Motor Feeders	5
9. Crane Contact Rail System	30
Total	100

Estimates for 60 per cent of the contract price will be made when all the material has been delivered and accepted at the site of the work provided such material be stored and protected from corrosion in a manner satisfactory to the contracting officer. The remaining 40 per cent will be estimated when all the material has been installed, connected complete, tested and accepted. If any material stored and partly paid for be not kept protected in a manner satisfactory to the contracting officer no further payment on this item will be made, and the material will be kept protected by the contracting officer at the expense of the contractor.

Section XX—Alterations at Upper Gate of Lock "A"

20-01. Existing Gate.—There is a temporary, upper mitering gate installed in Lock "A" as indicated on sheet 21/5B. Each leaf of the gate consists of 2 sections, bolted and riveted together by splice plates and so designed that when separated, the top section will form the permanent upper gate.

20-02. The gate shall be removed and separated, and the bottom section placed on a barge to be furnished by the contracting officer.

20-03. In removing the existing gate leaves, the 2 pintles and the pintle castings now in place shall be removed and reset for the permanent leaves as indicated on sheet 21/8B. The pintle shoes and quoin bearing blocks now in place, shall be left in place and shall be grouted in when the gate sill is raised. New pintle shoes marked P5-R&L, sheet 21/8B, shall be furnished and installed by the contractor. The pattern for the shoes will be the same as that indicated on sheet 21/7B, but the lug connecting the shoe to the quoin [fol. 302] bearing must be removed in order that the shoes can be set adjacent to the existing quoin bearing blocks.

20-04. The concrete sill for the gate shall be raised, a concrete sill for the emergency dam constructed, and the top section of the temporary gate permanently installed, complete and ready for operation.

20-05. Each leaf of the gate shall be permanently fitted to the anchorage now in place, utilizing the gudgeon pins in the temporary gate leaves.

20-06. Machinery for operating the gates is installed and shall be reconnected by the contractor if disconnected during the alterations.

20-07. Payment for all labor for removal and replacement of the gate as specified above, will be made at the contract lump-sum price for "Alterations at Upper Gate of Lock "A". Payment for all new materials will be made at the contract unit prices for the various items required.

Section XXI—Miscellaneous Items of Work

21-01. Tow-Haulage Units.

(a) General.—The contractor shall provide 2 electric-motor-driven single-drum hoists for tow-haulage service

through the locks. They shall be located on the intermediate wall as indicated on sheet 29/5 and installed and wired, complete and ready for operation.

(b) Hoist Frames.—

(1) The hoists shall be assembled and mounted complete on a single base or bed plate. The bed plates shall be single steel or iron castings, or of electric arc-welded structural steel, properly proportioned to insure rigidity and strength, and accurately faced to receive the power plant side stands and pillow blocks. They shall be amply provided with holes for anchor bolts.

(2) The side stands and pillow blocks, unless cast integral with the bed plates, shall be of cast iron or steel, strongly webbed, and shall have accurately faced bearing surfaces of ample area. They shall be secured to the bed plates in such manner as to insure absolute alignment and rigidity.

[fol. 303] 21-01. (c) Hoist Drums.—

(1) Each unit shall have 1 friction drum not less than 10 inches in diameter and with a capacity of 1,000 feet of ½-inch wire rope.

(2) The drum shall be of cast steel or iron with machine-finished surfaces on the body and inner side of the flanges. The shaft shall be of high-grade machinery steel, accurately turned and ground to size and fitted with bronze bearings of ample area to withstand severe service without heating or undue wear.

(3) The drum frictions shall be of the cone or internal-expanding type, faced with seasoned hardwood blocks, moulded asbestos blocks, or woven-wire asbestos fabric. They shall be so designed and adjusted that they will develop the full power of the unit with a minimum of pressure upon the control lever.

(4) The drum shall be equipped with a positive foot brake on the opposite end from the friction. The brake band shall be faced with seasoned hardwood blocks, moulded asbestos blocks, or woven-wire asbestos fabric. It shall be easily adjustable and supported with a spring bracket in order to prevent dragging when not in use.

(5) The drum friction, brakes and bearings shall be so adjusted that, when not in operation, the drum may be revolved freely by hand.

(6) The drum shall be provided with a winchhead, rachet, and pawl. The rachet shall be of cast steel, heavily shrouded, or forged steel. The pawl shall be of forged steel.

(d) Hoist Gearing.—All gears and pinions shall be of cast or forged steel with accurately cut teeth and fully protected by safety guards.

(e) Hoist Lubrication.—A simple, positive method shall be provided for the lubrication of all bearings and moving parts of the complete drum and gearing.

(f) Hoist Power Plants.—

(1) The power plants shall be designed for operation on 3-phase, 60-cycle, 440-volt alternating current.

[fol. 304] 21-01. (f)-(2) Each complete unit shall be designed to develop a single line pull of not less than 4,000 pounds at 100 feet per minute, on the bare drum.

(g) Electric Motors and Control.—

(1) General.—The electric equipment specified under this item shall conform to the requirements of Sections V and XIX unless otherwise specified. All electrical parts of the motors and control shall be designed to carry, without exceeding the limiting temperature rise prescribed in the American Institute of Electrical Engineers' standardization rules, full load for 30 minutes and twice full load for a period of 2 minutes. Full load shall be considered to be the maximum line pull and speed as specified, and twice full load when exerting twice the line pull specified.

(2) Motors—General.—The motors for the hoists furnished under this item shall be of the wound rotor, induction type, with horizontal splash-proof and weather-proof frame construction, wound for 440-volts, 3-phase, 60-cycle operation. They shall have a starting torque of 2¼ times full load, and a pull out torque of 2½ times full load torque.

(3) The Frames and End Brackets shall be of refined cast iron or equally rugged construction and shall be so de-

signed that rain or snow driven at the motor from any direction shall not enter the windings. Cover plates shall be provided on each side of one end bracket to allow access to the brushes. All screws, bolts, nuts and other steel parts used on the frames, as well as the shaft, shall be "Parkerized" or similarly treated to prevent rust. The brush holder supports and rigging, if of ferrous material, shall be galvanized, sherardized or similarly treated to prevent rusting. The slip rings shall be of brass, shrunk or pressed on and insulated from the shaft by mica. Water-tight conduit terminal boxes shall be provided for each winding. One lifting ring centrally located, shall be provided.

(4) Bearings.—The motors shall be provided with interchangeable ball bearings so installed that the end brackets may be removed without exposing the ball bearings. Each bearing housing shall have 2 greasing plugs located 180 degrees apart. The housing shall be designed to prevent dust, grit or any foreign substance from entering.

[fol. 305] 21-01. (g)-(5) All Windings shall have Class "A" insulation, thoroughly impregnated with moisture and oil-proof insulating varnish.

(6) Tests shall be in accordance with the American Institute of Electrical Engineers' standards. One motor shall be given a complete test at the factory.

(7) Controllers—General.—The control equipment for each motor shall consist of a manually operated non-reversing drum controller; a 3-pole magnetic line contactor; a duplex inverse time-limit gravity reset, overload relay and grid resistance bank for the secondary circuit. The control equipment shall be mounted in a compact and substantial manner on the bed of the hoist and enclosed in a weather-proof housing of heavy sheet iron, "Armco" or equal. The housing shall completely protect all the control parts from the weather, and be of a convenient height for operating the controller. The operating shaft of the drum controller shall extend through the top of the housing at such a point that the motor can be controlled by the operator when standing in a position to control the friction drum. Suitable doors or panels shall be provided on the housing so that the control equipment will be readily accessible for adjustments, repairs or replacements, without sac-

rificing the weather-proof feature of the housing. The exterior side surfaces of the housing shall be free from projecting handles or other accessories. The line contactor and overload relay shall be assembled on a 1¼-inch ebony asbestos panel.

(8) The control shall be wired so as to give no-voltage protection; the line contactor on being tripped, either from over-load or low voltage, shall reset only when the drum controller is returned to the neutral position.

(9) The drum controller shall provide primary contacts for all leads to the motor, the necessary contacts for secondary acceleration, and a contact in the neutral position for resetting the line contactor after it has been tripped due to over-load or low voltage. When in the neutral position the drum controller shall open all leads to the motor. The motor shall be started with the external resistance in the three legs of the secondary circuit which will allow the maximum starting torque on the first notch. The controller shall then cut down the starting resistance in not fewer than 6 steps to an amount which on the last step will give the [fol. 306] unit its rated pull of 4,000 pounds on the line, with a line speed of 100 feet per minute. The steps of acceleration between these shall be as smooth as possible.

21-01. (g)-(10) The overload relay shall be similar and equal to the Cutler-Hammer Manufacturing Company's bulletin 10175.

(11) The resistances shall be of the flat ribbon noncorrodible metal type, mounted on suitable supporting frames. They shall be of the heavy duty type capable of starting and controlling the motor under any condition of load or speed not injurious to the motor. They shall be rigidly mounted and so located that the air can circulate freely and also be accessible for removal or inspection.

(12) Wiring.—All control wiring inside the controller cabinet shall be No. 12, single stranded conductor as specified in paragraph 5-07(a). All resistor wiring shall be single solid conductor of the proper cross section, insulated with Rockbestos Table "A" insulation or equal. Connection between the controller and the power plug shall be made by means of a four-conductor rubber-clad portable cord of suitable length, and of the same size conductors

as the feeder cable, similar and equal to "Tirex" portable cord as manufactured by the Simplex Wire and Cable Company. The portable cord shall be connected to the controller through soldered terminals, and suitably anchored to prevent any strain on the electrical connection. A watertight extension cable connector similar and equal to the "Arkite" connector as manufactured by the Crouse-Hinds Company, shall be provided for making connection to the power plug. The connections between the controllers and the motors shall be made by means of a three-conductor portable cord as specified above, anchored in a flexible metal conduit. All electrical connections shall be made with soldered terminals bolted and sweated together. The flexible conduit shall be suitably connected to the control housing and terminal boxes, by approved connectors.

(h) Accessories.—The complete units shall be equipped with all grease and oil cups, special tools, and any other necessary operating or maintenance accessories.

(i) Painting.—The complete units shall receive 1 shop coat and 1 field coat of red lead paint and 2 field coats of aluminum paint, as specified in paragraphs 4-45 and 4-46.

(j) Payment for the complete units, furnished, installed, [fol. 307] painted, wired and ready for operation, will be made at the contract unit price for "Tow-Haulage Units."

21-02. Storm Sewer.—(a) A storm sewer shall be constructed back of the land wall of the locks as indicated on sheet 20/23B. It shall consist of approximately 20 linear feet of 36-inch, concrete pipe connection to an existing sewer and approximately 365 linear feet of Class "A" concrete section poured in place. The required 36-inch concrete pipe will be furnished by the United States and shall be installed by the contractor, the cost of laying to be absorbed in the contract unit prices for the various items of the complete work. The joints shall be made with mortar composed of one part of Portland cement to two parts of sand.

(b) The contracting officer may require all or any part of the sewer to be supported on timber piles as indicated on the drawings, dependent upon the foundation conditions at the time of its construction.

(c) Payment will be made at the contract unit prices for the various items entering into the work.

21-03. (a) A 12-inch Vitrified Clay Pipe Drain shall be constructed back of the land wall of the lock as indicated on the drawings. It shall be of double-strength, bell-and-spigot pipe as specified in paragraph 6-05, laid with open joints and surrounded by at least 12 inches of 2-inch washed gravel or screened crushed stone. The upper end shall be properly fitted with a vitrified clay plug. Where it enters the masonry at the lower end, the pipe shall be protected by a closely fitted 24-inch sleeve of No. 16 gage galvanized sheet metal.

(b) Payment will be made at the contract price per linear foot for "Pipe—Vitrified Clay—12-inch," which price shall include all materials and labor for the complete drain constructed in place.

21-04. A Bulkhead for the Turbine Intake shall be constructed of oak timber as indicated on sheet 20/24B and installed in the recess provided in the river wall of the locks. Payment will be made at the contract unit prices for the various items required.

21-05. Removal of Stone-Filled, Timber-Crib Ice Breaker.—The existing protection crib below Pier No. 6, indicated on sheets 10/4 and 40/23, shall be removed when so ordered by the contracting officer. The structure consists of timber cribbing filled with one- and two-man stones. The materials removed shall become the property of the contractor. All costs of the work shall be included in the price bid for this item.

[fol. 308] 21-06. A Lock Emergency Bulkhead, consisting of steel girders and oak-timber needles, shall be constructed as indicated on sheet 30/1B. Payment will be made at the contract unit prices for the various items of materials required.

Section XXII—Contingent Work

22-01. General.—All work listed under this section may or may not be done, subject to the conditions stated in paragraph 2(c).

22-02. Storage Facilities for Emergency Bulkhead.

(a) The emergency bulkhead units shall be stored immediately back of Pier No. 6, as indicated on sheets 40/22 and

53/12. The facilities to be provided shall include the superstructure, tracks and trucks for handling the units, all supported on concrete footing with pile foundation and paved with concrete.

(b) The concrete paving shall be approximately 50 feet wide, 125 feet long and eight inches thick. The concrete shall be placed in separate sections or blocks, generally 10 feet square, separated by expansion joints filled with ready roofing paper weighing 55 pounds per square. The paving and footings shall be reinforced with mesh and rods as indicated on the drawings. Short sections of standard gage track of 50-pound A. S. C. E. rail shall be embedded in two of the footings for the operation of two 4-wheel trucks, upon which three of the units will be stored.

(c) The Service Bridge Extension shall consist of three bents of truss-connected columns supporting runway girders for the bridge-crane unit. It shall be constructed as indicated on sheets 53/12 and 53/13, properly connected to the bridge and provided with electric current conductors for operation of the bridge-crane. (See paragraph 19-08.)

(d) Concrete, Metal Work and Painting.—The concrete shall be Class "A" in conformity with the requirements of Section III. Metal work and painting shall be as specified for the service bridge, under Section IV.

(e) Payment will be made at the contract unit prices for the various items entering into the work.

22-03. Trucks for Bulkhead Storage.

(a) General.—Two steel, standard gage, 45-ton, 4-wheel, outboard-roller-bearing trucks shall be provided for storage of three bulkhead units. They shall be constructed as [fol. 309] indicated on sheet 58/7.

22-03. (b) Frame.—The frame shall be constructed of a structural steel. All rivet holes shall be subpunched and reamed and all exposed edges shall be ground to remove sharp corners.

(c) Axles.—The axles shall be of alloy steel conforming to the standard specifications of the American Society for Testing Materials, for "Quenched and Tempered Alloy-Steel Axles," serial designation A-63-27, Class "L". They shall be finished to the dimensions indicated on the draw-

ing, for a 50-ton press fit of the wheels. The journal ends shall be ground on centers for mounting the roller-bearing cones. The surfaces for the sleeve at the inner end of the journal housing shall be ground for the removal of the wheel and/or cone bearing.

(d) Wheels.—The wheels shall be of open-hearth steel conforming to the standard specifications of the American Society for Testing Materials for "Wrought Solid Carbon-Steel Wheels for Electric Railway Service," serial designation A-25-24. They shall be bored for a 50-ton press fit on the axles and the flange and tread shall be turned to the contour and dimensions indicated on the drawing and then chilled. Each wheel, after assembly on the axle, shall run true and shall back-gage from head of rail 3/16 inch.

(e) Bearings.

(1) Each roller bearing shall consist of one double cone, two cups, two sets of tapered rollers retained in their respective cages, and one sleeve with solid band pressed on oil slinger. They shall be similar and equal to the Timken Bearing No. 799, shaft bore 3-7/8 inches, designed to meet the rated capacity of combined live and dead loads for one truck of 45 tons at a speed of 5 R. P. M.

(2) The labyrinths on the inner side of the journal housing shall contain two inner and one outer, annular grooves. The inner grooves shall be packed with ⅛-inch felt, similar and equal to Specification No. 15 of the Felters Company, Inc. The outer groove shall be packed with ⅛-inch sheet packing, similar and equal to Johns-Manville Service, No. 60.

(f) Yoke and Housings.

(1) The yokes, journal housings, covers and cover plates shall be of cast steel conforming to the standard specifications of the American Society for Testing Materials for [fol. 310] "Carbon Steel Castings for Railroads," serial designation A-87-27, Grade "B".

22-03. (f)-(2) Each yoke shall conform to the detailed dimensions shown and the pads and bases shall be cast high to allow for machining and grinding. All exterior and interior corners shall be rounded to a 3/16-inch radius.

(3) The holes for the 7/8-inch turned bolts shall be reamed to 29/32 inch diameter and the boss for seat of nut shall be ground to 1/16 inch high. All unfinished surfaces shall be tumbled clean and bright and in no case shall any metal be finished less than the dimension indicated. The bearing surface of the yoke in contact with the journal housing shall be hardened and ground to a true plane parallel to the bottom of the 12-inch channel stringer. The surface of the yoke in contact with the bottom flange of stringer shall be planed. Bolts shall be of forged steel with die-cut threads. Nuts shall have tapped threads.

(4) Each journal-housing casting shall be finished to full dimension, tumbled clean and bright, and all interior surfaces turned to exact requirements of the roller-bearing cups. The bearing surface between thrust legs shall be hardened and ground at the crown of a 50-inch radius arc, 1¼ inches thick at the crown of the turned seat for cups. This seat shall match concentric with both axes of the roller bearing, and along its longitudinal dimension. It shall be normal to the pads on the sides of the housing, which pads are finished 1/16 inch high.

(5) The face, cover and cover plate of each journal box shall be accurately cast and machined as indicated on the drawings. The space between finished pads of the journal housing and cover shall allow for three sheet-brass shims for adjustment of the roller bearings. The cover shall be fastened by four ¾-inch, machine-turned, tap bolts screwed into holes tapped in the cored body of the housing. The ½-inch drain plug shall be oil-tight and shall seat on a finished, beveled seat in the body of the wall of the housing. The cover plate shall fasten with two ½-inch diameter, machine tap bolts. All parts shall be oil-tight.

(g) Metal Work.—Unless otherwise specified or required, all metal work shall be in conformity with the requirements of Section IV.

[fol. 311] 22-03. (h) Painting.—The trucks shall be painted in conformity with the requirements of Section IV, paragraphs 4-45 and 4-46. They shall receive one shop coat of red lead paint and two field coats of aluminum paint, as specified for the service bridge.

(i) Payment will be made at the contract price for "Four-wheel Trucks (Bulkhead Storage)," which shall include

the two trucks, constructed, assembled, painted and installed in place.

22-04. Temporary Abutment for Dam.

(a) The following items of work shall be executed as indicated on the drawings and otherwise specified in order to provide a temporary abutment for the dam:

1. Steel Sheet Piling Cut-off Wall above Pier No. 6, as specified in paragraph 2.

2. Timber-Cribbing below Pier No. 6.

3. A 24-inch Cast-Iron Pipe Sewer, approximately 250 feet in length, extending from an existing open drain at the Government property limits, to discharge into the river immediately below Pier No. 6 as shown on sheet 40/14.

4. Grading and filling the river bank above and below Pier No. 6.

5. Riprap and Derrick Stone protection for the river bank immediately above and below Pier No. 6.

(b) Payment will be made at the contract unit prices for the various items entering into the work.

U. S. Engineer Office, Huntington, W. Va.
September 15, 1932.

[fol. 312] Standard Government Form of Bid

(Construction Contract)

(Place) ——.
(Date) —— —, ——.

To the District Engineer, U. S. Engineer Office, P. O. Box 1780, Huntington, W. Va.

In compliance with your invitation for bids dated —— —, 1932, and subject to all the conditions thereof, the undersigned, —— ——, a corporation organized and existing under the laws of the State of ——, a partnership consisting of —— —— or an individual trading as —— —— of the city of —— hereby proposes to furnish all plant, labor and materials, and perform all work required for the construction of the second (Lock "B") of the twin locks, a roller-gate dam, alterations at the upper gate of Lock "A",

a power house on the river wall of the locks; the furnishing and installing of the power house machinery, tow-haulage units, and lock illumination and signal light systems; all other work indicated on the drawings or required by the specifications, and incidental work needed or ordered in writing by the contracting officer; at London Lock and Dam, Kanawha River, in strict accordance with the specifications, schedules and drawings, for consideration of the unit prices listed in schedule below.

Item No.	Approximate Quantities	Unit	Designation	Unit Price	Total
1.	1,134	Lin. Ft.	Cofferdam—Lock "B", per linear foot of permanent work inclosed	....	....
2.	584	Lin. Ft.	Cofferdam—Dam, per linear foot of permanent work inclosed	....	....
3.	Sum	Sum	Cofferdam—Auxiliary (work in Lock "A")	....	....
[fol. 313]					
4.	151,000	Cu. Yd.	Excavation—Common	....	....
5.	5,700	Cu. Yd.	Excavation—Rock	....	....
6.	24,300	Sq. Ft.	Channeling—Rock	....	....
7.	1,400	Lin. Ft.	Drilled Holes—Grouting—1st 10 feet	....	....
8.	500	Lin. Ft.	Drilled Holes—Grouting—2d 10 feet	....	....
9.	400	Bbl.	Grouting	....	....
10.	35,000	Cu. Yd.	Fill	....	....
11.	8,500	Lin. Ft.	Piling—Round Timber	....	....
12.	15,600	Sq. Ft.	Piling—Steel Sheet	....	....
13.	42	M.B.M.	Timber—Oak	....	....
14.	25	M.B.M.	Timber—Yellow Pine—Creosoted	....	....
15.	15,300	Cu. Yd.	Concrete—Class "A"	....	....
16.	58,000	Cu. Yd.	Concrete—Class "B"	....	....
17.	1,824,000	Pound	Steel—Structural	....	....
18.	368,600	Pound	Steel—Nickel	....	....
19.	3,400	Pound	Steel—Cold-rolled	....	....
20.	492,000	Pound	Steel—Reinforcing	....	....
21.	29,400	Pound	Forgings—Steel	....	....
22.	281,000	Pound	Castings—Steel—Class "A"	....	....
23.	105,000	Pound	Castings—Steel—Class "B"	....	....
24.	12,400	Pound	Castings—Steel—"Nickel"	....	....
[fol. 314]					
25.	11,800	Pound	Castings—Iron	....	....
26.	24,300	Pound	Bolts	....	....
27.	1,400	Pound	Bronze	....	....
28.	3,800	Pound	Babbitt Metal	....	....
29.	4,700	Pound	Pipe—Cast Iron	....	....
30.	58	Lin. Ft.	Pipe—Steel—6-inch	....	....
31.	600	Lin. Ft.	Pipe—Vitrified Clay—12-inch	....	....
32.	Sum	Sum	Pipe—For hydraulic operation system and water, gas, gasoline and oil supply lines	....	....
33.	4,630	Lin. Ft.	Conduit—Fibre—3-inch	....	....
34.	176	Lin. Ft.	Conduit—Fibre—4-inch	....	....
35.	160	Lin. Ft.	Conduit—Metal—1-inch	....	....
36.	1,860	Lin. Ft.	Conduit—Metal—1½-inch	....	....
37.	150	Lin. Ft.	Conduit—Metal—2-inch	....	....
38.	3,950	Lin. Ft.	Conduit—Metal—2½-inch	....	....
39.	1,500	Lin. Ft.	Conduit—Metal—3-inch	....	....
40.	820	Lin. Ft.	Handrailing—Pipe	....	....

Item No.	Approximate Quantities	Unit	Designation	Unit Price	Total
41.	2	Each	Stoney Gate Valves—complete	....	....
42.	4	Each	Operating Machines—Lock Gate	....	....
43.	Sum	Sum	Power House	....	....
44.	Sum	Sum	Machinery—Power House	....	....
45.	2	Each	Tow-Haulage Units	....	....
46.	5	Each	Roller-Gates—Complete with Operating Machinery	....	....
[fol. 315]					
47.	5	Each	Operating Houses (On Dam Piers)	....	....
48.	565	Trk. Ft.	Crane Track—50-lb. Rail	....	....
49.	565	Trk. Ft.	Crane Track—80-lb. Rail	....	....
50.	Sum	Sum	Revolving Locomotive Crane—Electric	....	....
51.	Sum	Sum	Bridge-Crane Unit—Electric	....	....
52.	Sum	Sum	Electric Wiring, Illumination and Control Equipment	....	....
53.	Sum	Sum	Alterations at Upper Gate of Lock "A"	....	....
54.	Sum	Sum	Removal of old rock-filled timber-crib ice breaker	....	....
			Contingent Work		
55.	40,000	Cu. Yd.	Excavation—Common	....	....
56.	6	Cu. Yd.	Excavation—Rock	....	....
57.	120	Sq. Ft.	Channeling—Rock	....	....
58.	11,600	Cu. Yd.	Fill	....	....
59.	5,200	Cu. Yd.	Stone—Riprap and Derrick	....	....
60.	1,380	Lin. Ft.	Piling—Round Timber	....	....
61.	22,200	Sq. Ft.	Piling—Steel Sheet	....	....
62.	22	M.B.M.	Timber—Common	....	....
63.	240	Cu. Yd.	Concrete—Class "A"	....	....
64.	280	Cu. Yd.	Concrete—Class "B"	....	....
65.	83,500	Pound	Steel—Structural	....	....
66.	6,600	Pound	Steel—Reinforcing	....	....
[fol. 316]					
67.	2,200	Pound	Bolts	....	....
68.	59,300	Pound	Pipe—Cast Iron	....	....
69.	157	Trk. Ft.	Crane Track—50-lb. rail	....	....
70.	2	Each	4-wheel Trucks	....	....
71.	Sum	Sum	Electrical Wiring	....	....
				Total	$....

NOTE.—All amounts and totals given above will be subject to verification by the United States. In case of variation between unit bid price and totals shown by bidder the unit price will be considered to be his bid.

[fol. 317] Plant to be Used on the Work

(See Invitation for Bids)

Use separate line for each major item.
Specify whether land or floating equipment.

Excavating & Dredging

No.	Name	Kind	Capacity	Age and Condition
1	.....	.....	.....	.....
2	.....	.....	.....	.....
3	.....	.....	.....	.....
4	.....	.....	.....	.....
5	.....	.....	.....	.....

Pile Driving

6	.....	.....	.....	.....
7	.....	.....	.....	.....
8	.....	.....	.....	.....
9	.....	.....	.....	.....

Drilling

10	.....	.....	.....	.....
11	.....	.....	.....	.....
12	.....	.....	.....	.....
13	.....	.....	.....	.....
14	.....	.....	.....	.....
15	.....	.....	.....	.....
16	.....	.....	.....	.....
17	.....	.....	.....	.....

[fol. 318] Concreting

18	.....	.....	.....	.....
19	.....	.....	.....	.....
20	.....	.....	.....	.....
21	.....	.....	.....	.....
22	.....	.....	.....	.....
23	.....	.....	.....	.....
24	.....	.....	.....	.....
25	.....	.....	.....	.....
26	.....	.....	.....	.....
27	.....	.....	.....	.....

Material Handling

No.	Name	Kind	Capacity	Age and Condition
28				
29				
30				
31				
32				
33				
34				
35				

Pumping

36				
37				
38				
39				
40				

[fol. 319]

Miscellaneous

41				
42				
43				
44				
45				
46				
47				
48				
49				
50				

Experience (See "Information to be Submitted" in Invitation for Bids.)

Name, address, and experience of organization by whom the roller-gate plans will be prepared:

_____

_____

_____

[fol. 320] Name, address, and experience of organization by whom the roller gates will be fabricated and/or erected:

_____

_____

_____

The undersigned agrees, upon receipt of written notice of the acceptance of this bid within 60 days after the date of opening of the bids, to execute the standard form of Government contract, in accordance with the bid as accepted, and give bond, with good and sufficient surety, or sureties, for the faithful performance of the contract, within 10 days after the prescribed forms are presented for signature.

Performance will begin within 10 calendar days after date of receipt of notice to proceed and will be completed as specified in paragraph 6 of specifications.

——— ———, by ——— ———, (Business address.) ———.

NOTE.—Read Standard Government Instructions to Bidders before preparing this bid.

[fol. 321] Data Sheet for Gasoline-Electric Generating Unit

(To be filled in by bidders)

Sheet 1 of 2

1. Engine: (Manufacturer) ———.
   No. Cylinders: ———.
   Bore and Stroke: ———.
   Brake M. E. P. and Piston Speed at Rated Output: ———.
   Lbs. Fuel per K. W. Hr. @ 125% Rated Output of Generator: ———.
   Lbs. Fuel per K. W. Hr. @ 100% Rated Output of Generator: ———.
   Lbs. Fuel per K. W. Hr. @ 75% Rated Output of Generator: ———.
   Lbs. Lubricating Oil per K. W. Hr. @ 100% Rated Output of Generator: ———.
   Carburetor (Make, Number, Size): ———.
   Muffler (Make): ———.
   Ignition System (Make, Type, Voltage): ———.
   Starter (Make): ———.
   Generator (Make and Capacity): ———.
   Battery Charger (Make and Type): ———.
   Net Weights: Engine, — Pounds.
   Generator and Exciter, — Pounds.
   Complete Unit, including Common Base, — Pounds.
   Heaviest Part to be Handled During Erection — Pounds.

Shipping Weight (Complete Unit): — Pounds.

2. Electric Generator: (Manufacturer) ——.
   Rating: — K. V. A., — R. P. M., — Phase, — Cycles, — Poles, — Volts, — Amps., — P. F. (Lagging).
   Insulation: Stator, Class —. Rotor, Class —.

Data Sheet for Gasoline-Electric Generating Unit—Continued

[fol. 322] Sheet 2 of 2

Temperature Rise, Continuous Operation at Full Load and 0.8 P. F.: ——.
Shunt-Wound Exciter Rating: — K. W., — Volts.
Efficiency, at 80% lagging power factor, as determined in accordance with A. I. E. E. standardization rules, will not be less than the following:
Full Load —%, ¾ Load —%, ½ Load —%.
Spare Parts and Accessories: ——.

[fol. 323] Data Sheet for Tow-Haulage Units

(To be filled in by bidders)

Sheet 1 of 2

1. Hoist (Manufacturer): ——.
   Line pull: — pounds @ — ft. per minute.
   Drum:
   (a) Length, — inches.
   (b) Diameter of barrel, — inches.
   (c) Diameter of flanges, — inches.
   (d) Capacity of ½-inch cable, — feet.
   Friction Clutch:
   (a) Type (internal expanding or cone) ——.
   (b) Lining (material and type) ——.
   Gearing:
   (a) Pinions (material) ——.
   (b) Gears (material) ——.
   Bed Plate (material and type) ——.
   Type of lubrication (pressure gun or grease cups) ——.
   Type of motor drive (gear or silent chain) ——.
   Overall dimensions: Length — ft. x width — ft.
   Weight: — pounds.
2. Motor (Manufacturer): ——.
   Horse Power ——.
   Full Load R. P. M. ——.
   Efficiency ——.

Data Sheet for Tow-Haulage Units—Continued

[fol. 324] Sheet 2 of 2

Time rating and temperature rise: — hours — degrees C:
Starting torque: —% full load torque.
Pull-out torque: —% full load torque.
Class of insulation: Stator —. Rotor —.
Bearings (type): —. Interchangeable? —.
Frame Construction (type and material): ——.
Brush holders (material): ——.
Slip rings (material): ——.
End brackets (material): ——.
Terminal box covers (material): ——.

3. Drum Controller (Manufacturer): ——.
Number of steps: ——.
Is no voltage protection provided? ——.
Overload relay: Manufacturer ——. Type —.
Resisters (type of starting duty A. E. S. standard): ——.
Wiring:
(a) Control ——.
(b) Resister connections ——.
(c) Incoming and motor connections ——.
Disconnecting power plugs: ——.
Housing for controller:
(a) Material ——.
(b) Construction ——.

[fol. 325] Data Sheet for Lock Exterior Lighting and Signal Lighting Equipment

(To be filled in by bidders)

(1) Lock Lighting Equipment:

Equipment	Manufacturer	Type
Lighting Standard		
Lighting Unit Complete		
Pipe Fittings		
Junction Boxes		
Wire and Cable		
Fuses		
Connector Plug		

Data Sheet for Lock Exterior Lighting and Signal Lighting Equipment—Continued

(2) Lock Signal Lighting Equipment:

Equipment	Manufacturer	Type
Signal Light Standard	.....	.....
Signal Light Unit	.....	.....
Flood Lights	.....	.....
Transformers	.....	.....
Pole Clamps and Fittings	.....	.....
Wire and Cable	.....	.....
Connector Plugs	.....	.....

[fol. 326] Switchboard Data Sheet

(To be filled in by bidders)

Sheet 1 of 2

(1) Power House Switchboard:

Manufacturer: ——.

Equipment	Manufacturer	Type
Air Circuit Breakers, Manually Operated	.....	.....
Oil Circuit Breakers, Manually Operated	.....	.....
Voltage rating — Amperes —	.....	.....
2-o.c.o. interrupting capacity — at — volts	.....	.....
Knife Switches, double throw	.....	.....
Knife switches, single throw	.....	.....
Generator and Exciter Rheostats	.....	.....
Voltage Regulator	.....	.....
Voltmeters and Ammeters	.....	.....
Watt Meter	.....	.....
Watt-Hour Meter	.....	.....
Totalizing Graphic Wattmeter	.....	.....
Instrument Transformers	.....	.....
Instrument Switches	.....	.....
Terminal Blocks	.....	.....
Master Control Switches	.....	.....
Air Signal Control Switch	.....	.....
Fuses, N. E. C.	.....	.....
Switchboard Wire	.....	.....
Distribution Transformers (lighting)	.....	.....

Switchboard Data Sheet—Continued

[fol. 327] Sheet 2 of 2

Equipment	Manufacturer	Type
Magnetic Contactors		
Reverse Phase Relay		
Auxiliary Relay		
Bus Bars		
Indicating Lights		
Thermal Overload Relays		
Timing Relay		
Material of Panels		
Wire		

[fol. 328] Data Sheet for Incoming Line and Miscellaneous Control Equipment

(To be filled in by bidders)

Equipment	Manufacturer	Type
Remote Control Stand		
Cable Terminators, 600 volt		
Power Cable		
Control Cable		
Lighting Cable		
Master Switches		
Push Buttons		
Solenoid Control for Whistle		
Fuses, N. E. C.		
200 Watt Auto Transformers		
Rigid Steel Conduit and Fittings		
Flexible Steel Conduit		
Control Cable Junction Boxes		
Cable Hangers		
Cable Troughs		
Cable Vertical Supports		
Steel Conduit Boxes		

[fol. 329] Data Sheet for Air Compressor Unit and Air Signal

Air Compressor Unit:

(a) Manufacturer ——.
Type ——.

(b) Capacity — cu. ft. free air per minute.

(c) Piston Displacement — cu. ft.

Data Sheet for Air Compressor Unit and Air Signal—Continued

(d) R. P. M. —.
(e) Automatic Control? ——.
(f) Size and Type of Receiver ——.
(g) Motor:
(1) Manufacturer ——.
(2) Type — Voltage — R. P. M. —.
(3) Running Amp. — Full load eff. —.
(4) Class of Insulation ——.

Air Signal:
(a) Manufacturer ——.
Type ——.
(b) Operating pressure — Pounds.
(c) Free air required per second of operation — cu. ft.

[fol. 330] [Endorsed:] Received Sep. 23, 1932, Misc. Sales.

[fol. 331]

War Department
United States Engineer Office
Huntington, W. Va.

October 6, 1932.

Addenda

Circular No. 33-59, dated September 15, 1932, inviting bids to be opened at 10:00 A. M. (Eastern Time), October 15, 1932, for constructing the second (Lock "B") of the twin locks, a roller gate dam, alterations to the upper miter gate of the existing Lock "A," a power house on the river wall of Lock "A" and furnishing and installing the power house machinery and lock illumination system, at the London Lock and Dam, Kanawha River, West Virginia.

Notice is hereby given prospective bidders of the following changes in the plans and specifications for the above described work:

Specifications.

Page 8, paragraph 10. Delete last sentence.

Page 54, paragraph 4-41. Add the following sentence: The provisions of this paragraph apply to all work included, including lock armor.

Page 57, paragraph 4-47. Add the following new subparagraph: Unit Weight. Metal work material classified

on page 4 by weights as calculated from the dimensions indicated on the drawings are as follows:

Nickel steel 0.285 lb. per cubic inch.
Bronze and brass 0.311 lb. per cubic inch.
Babbitt metal 0.270 lb. per cubic inch.
All other metal 0.283 lb. per cubic inch.

Page 73, paragraph 7-02(c). Add the following: The materials shall be structural steel, standard rolled bar stock. The classification indicated on the drawings which is for the basis of payment only will be made at the contract unit price for forging steel. Bars tested to rupture will be paid for by the United States provided they pass the test.

[fol. 331½] Page 80, paragraph 9-20. Amend to read as follows: After the valve blades have been installed, they shall be raised and lowered by the hydraulic jacks under the specified oil pressure a sufficient number of times to assure the specified clearance has been provided and that the control devices and seals function properly.

Page 106, paragraph 13-01(a). Delete second sentence and substitute the following:

One gate shall be of the overflow type so designed as to permit flow up to five feet in depth over the top for the passage of drift and ice.

Page 111, paragraph 13-08. Delete entire paragraph and substitute the following:

Overflow Gates.—(a) Gate No. 4 located as indicated on drawing 40/0 shall be of the overflow type, so designed as to permit the passage of ice or drift over the top by lowering or raising the crest of the gate at will to a depth of five feet, or any lesser depth as desired below the normal pool elevation without interfering with the raising and lowering of the complete gate in a manner similar to the operation of the other gates.

(b) The dimensions, lateral and transverse bracing, plating and all parts of the overflow gate and its operating machinery shall conform to those of the regular gates as closely as the special purpose and operating arrangement of such gate permits, providing proper strengthening to care for increased stresses.

(c) Provisions shall be made for supporting the gate and relieving the lifting chain of its entire load, both when in normal position and when in position for overflow.

Plans.

Sheet 21/2B. Add the following general note immediately above the title: Weld or caulk all seams, joints, and corners of gates where necessary to obtain a water-tight structure.

Sheets 40/0, 40/21, 47/3, and details on other sheets connected with the submergible or overflow gate may, subject to the approval of the contracting officer, be modified to provide a type of overflow gate different from that indicated, provided however, that no type will be considered that has not been in successful operation. The contractor is not bound by details showing the type of gate for Gate No. 4. [fols. 332-643] A copy of these modifications shall be attached to each copy of each bid submitted and will be considered as comprising a part thereof.

Fred W. Herman, Major, Corps of Engineers, District Engineer.

[fol. 643-1] PLAINTIFF'S EXHIBIT No. 8 TO BILL OF COMPLAINT

House of Representatives

73d Congress, 1st Session

Document No. 31

Kanawha River, W. Va., from Lock No. 5 to Its Mouth

Letter from the Secretary of War Transmitting a Letter from the Chief of Engineers, United States Army, Dated April 20, 1933, Submitting a Report, Together with Accompanying Papers and Illustrations, on a Preliminary Examination and Survey of the Kanawha River, W. Va., from Lock No. 5 to Its Mouth, Authorized by the River and Harbor Act Approved January 21, 1927

May 4, 1933.—Referred to the Committee on Rivers and Harbors and Ordered to be Printed with 2 Illustrations

War Department,
Washington, April 21, 1933.

The Speaker of the House of Representatives.

DEAR MR. SPEAKER:

I am transmitting herewith a report dated April 20, 1933, from the Chief of Engineers, United States Army, on pre-

liminary examination and survey of "Kanawha River, W. Va., from Lock No. 5 to its mouth," authorized by the River and Harbor Act approved January 21, 1927, together with accompanying papers and illustrations.

Sincerely yours, Geo. H. Dern, Secretary of War.

[fol. 643-2]

War Department,
Office of the Chief of Engineers,
Washington, April 20, 1933.

Subject: Preliminary Examination and Survey of Kanawha River, W. Va., from Lock No. 5 to Its Mouth

To The Secretary of War:

1. I submit for transmission to Congress, my report with accompanying papers and illustrations, on preliminary examination and survey of "Kanawha River, W. Va., from Lock No. 5 to its mouth," authorized by the River and Harbor Act approved January 21, 1927.

2. The Kanawha River enters the Ohio at Point Pleasant, W. Va., 266 miles below Pittsburgh. The river lies wholly within the State of West Virginia. It is 97 miles long and serves an important industrial region with important resources in high-grade coal. The city of Charleston, W. Va., is about 58 miles above the mouth. Improvement to afford 6-foot slack-water navigation practically to the head of the main stem of the river was completed in 1898 at a cost of approximately $4,295,000 by the construction of 10 locks and dams, 6 of which are below Charleston and 4 above that city. The locks below Charleston have a width of 55 feet and length of 313 feet. Those above Charleston were constructed with a width of 50 feet and a length of somewhat over 270 feet. The modernization of the project above Charleston by the construction of two dams, each with a lift of 24 feet, with roller gates, and with twin locks 360 feet long and 56 feet wide suitable for 9-foot navigation, replacing the four old dams in this section, has been undertaken under the authority of the River and Harbor Act of July 3, 1930, and is well advanced toward completion. The present estimated cost of this improvement is about $6,000,000. The further improvement now desired by local interests is a similar modernization of the slack-water system between Charleston and the mouth to afford a depth of 9 feet with locks suitable for modern Ohio River barge navigation.

3. The city of Charleston has a population of somewhat over 60,000. It is estimated that the coal reserves immediately adjacent to the river amount to about 1,000,000,000 tons, and that 3,000,000,000 tons of coal are available within 5 miles of the banks. In 1930 approximately 33,000,000 tons of coal were mined, of which about 1,300,000 tons were shipped by water. Natural gas, petroleum, clay, stone, and lime are other resources. The principal articles produced in the manufacturing district along the river are chemicals and glass. River-borne commerce has steadily increased from a total of about 900,000 tons in 1924 to nearly 2,000,000 tons in 1931. The district and division engineers are of the opinion that the coal movement will increase by more than 1,000,000 tons if the river is adequately improved for modern barge navigation.

4. The district engineer presents and recommends a plan of improvement to afford a 9-foot channel, by the construction of a dam with a lift of 28 feet near Winfield, W. Va., about 31 miles above the mouth of the river and 27 miles below Charleston, with twin locks each 56 feet wide and 360 feet long and the construction of a dam in the Ohio River near Gallipolis, about 13½ miles below the mouth of the Kanawha, with a maximum lift of 26 feet, and with twin locks, one of standard Ohio River dimensions, 110 feet [fol. 643-3] wide and 600 feet long, the other 56 feet wide and 360 feet long. These two dams would replace the six low dams in the Kanawha River below Charleston and three of the dams in the Ohio River system. The plans provide for dams with roller gates to permit of full discharge opening during flood. The estimated cost of the improvement is $12,200,000. The higher pool level in the Ohio River afforded by the proposed dam will save an expenditure of about $834,000 in channel dredging to afford satisfactory channels through the present pools. The net cost of the proposed project is therefore estimated at $11,365,000.

5. The district engineer presents an analysis of the economic justification for the improvement. He finds that the net annual cost of the proposed works including interest on the investment at the rate of 3½ percent, amortization of the structures, and the operation and care of the two new locks and dams proposed, but deducting the cost of the operation and care of the three locks in the Ohio River and the six locks in the Kanawha River that will be replaced,

will amount to approximately $173,000. He estimates the transportation economies accruing to present commerce at approximately $150,000; and finds that an increase of but 300,000 tons per annum in the amount of coal transported out of the river would fully justify the improvement. The division engineer states that a market for this additional tonnage actually exists, and that there is no doubt that the savings necessary to justify the cost of the project will accrue. Navigation interests assert that far larger savings will result from the improvement, and present figures indicate transportation economies of approximately $1,000,000 per annum from the facilities to navigation proposed.

6. The division engineer concurs with the district engineer in recommending the improvement. These reports have been referred, in accordance with law, to the Board of Engineers for Rivers and Harbors. The Board is of the opinion that the actual construction of the improvement recommended should not be undertaken until the roller-type dams now under construction in the upper Kanawha River and at Montgomery Island on the Ohio River have been completed and operated a sufficient length of time to demonstrate their entire suitability. Subject to this reservation, it concurs with the division engineer in recommending the improvement.

7. After due consideration of these reports, I concur in the conclusion of the Board as to the advisability of the improvement. The Kanawha River is an important feeder to the Ohio with a well developed and increasing commerce and with large resources in high-grade coal so located as to be particularly adapted to water transportation. Transportation is now seriously hampered because of the lack of adequate depth. The figures presented in the reports of the district and division engineers establishing the economic justification for the improvement are conservative. The commerce on the river has been steadily increasing even with the present facilities for navigation, and a much larger increase in commerce than that necessary to justify the cost is confidently to be expected if the improvement is made. The plans submitted provide for dams with gates of the roller type, which appear to be well fitted for the service required. If experience shows that gates of a different type are more advisable, they will be installed. The type of gates

selected will not affect materially the cost of the work. Further investigation shows that a minor modification of the plans is advisable to provide a width of 110 feet instead [fol. 643-4] of 56 feet for the auxiliary lock at the proposed new dam in the Ohio. This modification will not require an increase in the estimated cost. I therefore report that the further improvement of the Kanawha River is advisable to provide a channel 9 feet deep through the river by the construction of a new dam near Winfield, W. Va., with twin locks having usable dimensions 56 feet by 360 feet and a new dam in the Ohio River near Gallipolis, Ohio, with one lock 110 by 600 feet and one lock 110 by 360 feet, all at an estimated cost of $12,200,000; the exact location and design of the dams and locks to be left to the discretion of the Chief of Engineers.

Lytle Brown, Major General, Chief of Engineers.

Report of the Board of Engineers for Rivers and Harbors

The Board of Engineers for Rivers and Harbors

Washington, D. C., January 30, 1933.

To the Chief of Engineers, United States Army:

* * * * * * *

2. The Kanawha River is formed by the junction of the New and Gauley Rivers, is 97 miles long, and lies wholly within the State of West Virginia. It flows in a general northwesterly direction and empties into the Ohio River at Point Pleasant, W. Va., 266 miles below Pittsburgh, Pa. The project, prior to its modification by the act of July 3, 1930, provided for 8 locks with movable dams and 2 locks with fixed dams to furnish a 6-foot navigable depth from the mouth to a point about 90 miles above. The River and Harbor Act of July 3, 1930, provides for replacement of the 4 uppermost existing locks and dams (nos. 2 to 5, inclusive), with 2 new locks and dams, and provides further for dredging in the river above Charleston, W. Va., with a view to securing a navigable channel 9 feet deep and 200 feet wide extending to the upper limit of the project. The two new locks and dams are now in process of construction, one at Marmet (mile 68) and the other at London (mile 83). With

the exception of the work authorized by the act of July 3, 1930, the project has been completed. The total cost to the United States to June 30, 1932, under existing and prior projects, was about $6,672,000 for new work and $4,456,000 for maintenance, including operation and care of locks and dams. The cost of new work to June 30, 1932, for the [fol. 643-5] section of river covered by this report, viz., Lock 5 to the mouth, was about $2,700,000. The approved estimate of the cost of annual maintenance for the entire project is $246,000, and for the section below Lock 5, $178,000. Prior to 1874 local interests expended small amounts on the improvement and maintenance of the river.

3. Local and navigation interests desire that Kanawha River, from Lock and Dam No. 5 to the mouth, be improved to provide navigation facilities equal to those now authorized for the reach above and comparable with those that now exist on the Ohio River. Specifically, it is desired that a 9-foot depth and larger locks be provided.

* * * * * * *

5. Charleston, W. Va., with a population of over 60,000 and situated about 58 miles from the mouth of the river, is the largest city in the valley. Other relatively small but important localities are Montgomery, near the head of the river; South Charleston, just opposite Charleston; and St. Albans, a few miles below Charleston. The principal industries along the river are coal mining, the manufacture of chemicals and ferro-alloys, and oil refining. From the head of the river to St. Albans the valley is highly industrialized and within the region there is an abundance of high grade coal. Below that point the bottom lands are fertile and used mostly for agricultural purposes. The area is adequately served by railroads and improved highways. The downbound movement of coal to Ohio River points and, in a lesser degree, to industrial centers on the Kanawha, constitutes the principal commerce of the river. Sand and gravel receipts from the Ohio River are next in importance, although gasoline and oil movements during the past 4 years show a marked increase. Miscellaneous items, includ- [fol. 643-6] ing steel products and chemicals, move in limited quantities. Considering the commerce as a whole, there has been a steady increase from a total of 900,000 tons in 1924 to nearly 2,000,000 tons in 1931. Self-propelled vessels

engaged in the traffic are towboats and packets of the shallow-draft, inland waterway type and mostly stern-wheel driven. Barges are generally 26 by 135 feet, with a capacity of 500 tons and 6-foot draft, although Ohio River barges, 26 by 175 feet, 9-foot draft and 1,000-ton capacity, occasionally enter the river on a reduced draft. The reporting officers are of the opinion that the existing and large potential tonnage in coal and the probable increase in water shipment of other bulk commodities, due to the further development of industry in the valley warrant additional improvement of navigation facilities, and believe that the savings reasonably to be expected fully justify the expenditures involved in the proposed improvements.

6. The Board concurs in the opinion of the district and division engineers that further improvement of the lower Kanawha is desirable. Most of the traffic that now uses the Kanawha also uses the Ohio, where there is a greater controlling depth and larger locks. With the navigable depth below lock 5 increased from 6 to 9 feet, cargoes could be greatly increased, and with larger locks and a smaller number, as proposed, there would be a material saving in time of transit. Additional advantages would accrue as a result of deeper, wider, and straighter channels and the ability to use larger size tows. Raising of existing structures and increasing the size of locks, though less expensive than other proposals, would interfere with navigation during construction and the resulting modified works would not eliminate the disadvantages of the existing movable dam project. New movable dams and locks to replace the present system throughout would involve a capital expenditure approximating that of a high dam project and, due to the number of structures, the cost of operation and maintenance would be considerably greater. Of the two plans providing for high dams, plan no. 2 appears to be the more desirable. In addition to offering navigation facilities on the lower Kanawha equal to plan no. 1, it would eliminate operation and maintenance charges on the Ohio amounting to $215,000 per year and render unnecessary certain contemplated channel improvements estimated to cost $834,000. The Board believes, however, that the difference in capital cost betwen plans nos. 1 and 2, $1,900,000, in addition to the $834,000 as proposed by the reporting officers, or a total of $2,734,000, should be charged against improvement of

the Ohio River, and that maintenance and operation of the proposed Gallipolis lock and dam should likewise be charged against the Ohio.

7. Though dams with the roller type of movable crest now proposed are already under construction on the upper Kanawha and at Montgomery Island on the upper Ohio, their satisfactory performance under operating conditions for navigation has not as yet been demonstrated by actual use. Also, while fixed dams not permitting the use of the open river during a considerable portion of the year have been constructed at two points on the upper Ohio and one is now under construction at Montgomery Island immediately below, there is some question as to whether the con- [fols. 643-7–643-40] struction of a similar dam as far down as Gallipolis, eliminating the advantage of such open-river navigation, would be entirely satisfactory to navigation interests on that river. The Board is therefore of the opinion that the actual construction of the improvements now recommended should not be undertaken until the dams referred to have been completed and operated a sufficient length of time to demonstrate their entire suitability.

8. The Board is of the opinion that the prospective general benefits are commensurate with the cost of the proposed improvements. Subject therefore to the view expressed in paragraph 7 above, it recommends that the existing project for the Kanawha River be modified so as to provide for a 9-foot channel from the mouth to the dam at Marmet, by the construction of one fixed dam with movable crest near Winfield, W. Va., and a similar dam in the Ohio River near Gallipolis, Ohio; and for twin locks with usable dimensions 56 by 360 feet at the Winfield Dam and for double locks, one 110 by 600 feet and the other 56 by 360 feet, at the Gallipolis dam in the Ohio River; all at an estimated cost of $12,200,000, of which $2,734,000 should be charged to the Ohio River improvement. The estimated annual cost of operation and maintenance is $75,000, of which that pertaining to the Gallipolis Dam should be charged to the Ohio River improvement. It is further recommended that the details of the proposed improvement, including exact location of dams and locks, type of dams and pool elevations, be left to the discretion of the Chief of Engineers.

9. In compliance with law, the Board reports that there are no questions of terminal facilities, water power, or other

subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the Board:

W. J. Barden, Colonel, Corps of Engineers, Senior Member.

[fol. 643-41] Report of the District Engineer

Syllabus

The Kanawha River is now improved by a slack-water project consisting of 2 locks with fixed dams (nos. 2 and 3) and 8 locks with movable dams (nos. 4 to 11), providing a navigable depth of 6 feet from the mouth to 88.8 miles above. Replacement of the upper 4 locks and dams (nos. 2 to 5) by a new project consisting of 2 locks and dams of higher lift and to provide a navigable depth of 9 feet, was authorized by the River and Harbor Act of July 3, 1930. Construction of both of the twin locks at one site (Marmet), and one of the twin locks at the other site (London), is practically completed. The District engineer now submits a plan of modification of the remaining section of the river (from Lock No. 5 to the mouth) by replacing the existing 6 locks and dams with 2 of high lift to provide a navigable depth of 9 feet, at an estimated cost of $10,309,000. He recommends, however, an alternative plan whereby a high-lift lock and dam would be placed in the Ohio River below the mouth of the Kanawha at an estimated cost of $12,199,000, to which a credit of $834,000 is applied for elimination of contemplated channel improvements in the Ohio River under the existing project, making the net estimated cost $11,365,000. This Ohio River lock and dam would be in lieu of the lower lock and dam in the Kanawha River and provide the same pool elevation. An initial appropriation of $3,000,000 is recommended and the remainder in approximately equal installments 1, 2, and 3 years following.

War Department,
United States Engineer Office,
Huntington, W. Va., August 15, 1932.

Subject: Report on Survey of Kanawha River, W. Va., Lock No. 5 to Mouth

To The Division Engineer, Upper Mississippi Valley Division, St. Louis, Mo.

1. Authority.—This report is submitted in compliance with the provisions of the River and Harbor Act of January 21, 1927, viz:

Sec. 4. The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following-named localities:

* * * * * * *

Kanawha River, West Virginia, from Lock Numbered 5 to its mouth.

* * * * * * *

A preliminary examination was made as prescribed by law and report thereon submitted May 18, 1928. This re- [fol. 643-42] port was reviewed by the Board of Engineers for Rivers and Harbors and a survey authorized by the Chief of Engineers, October 26, 1928, to determine the advisability, extent, and cost of improvement and maintenance.

2. Description.—The Kanawha River is formed by the junction of the New and Gauley Rivers, is 97 miles long, and lies wholly within the State of West Virginia. It flows in a general northwesterly direction and empties into the Ohio River at Point Pleasant, W. Va. Its watershed is approximately 12,300 square miles in area, and extends over the southern and central parts of West Virginia, western part of Virginia, and northwestern part of North Carolina. About 1 mile below the head of the river is Kanawha Falls, where there is a drop of about 15 feet. From the basin below Kanawha Falls to the mouth of the river, a distance of 95 miles, the total fall is 108 feet. From Kanawha Falls to Paint Creek, 15.5 miles, the slope averages 3.1 feet per mile. The river banks generally are covered with vegetation and are comparatively high, ranging from 40 to 55 feet above low water. The width of the river at normal stage is from 500 to 800 feet. The controlling depth for the section of the river covered by this report is on the bar at Charleston, and during low water it is 6 feet, at extreme high water

42 feet, and at mean stage approximately 20 feet. The average fall from Lock 5 to the mouth of the river is 0.7 foot per mile. At Lock 2, at Montgomery, 12 miles from the head, the difference between high and low water is 31 feet. The extreme low-water discharge at Charleston below the mouth of the Elk River is approximately 1,000 second-feet. At Lock 2, as determined by the United States Geological Survey, the minimum flow is about 850 second-feet, maximum about 250,000 second-feet, and mean annual 13,400 second-feet. The only connecting waterway is the Ohio River which is improved to provide a 9-foot navigable depth and with locks 110 by 600 feet in available dimensions. There are no published maps of the river covered by this report except the following quadrangle sheets of the United States Geological Survey: Charleston, St. Albans, and Winfield, W. Va.; and Glenwood, Ravenswood, and Point Pleasant, W. Va. and Ohio. Maps prepared for and accompanying this report show the hydrographical and topographical features of the river and valley to above high-water elevations. More information concerning these maps is given in paragraph 27, under the side heading "Surveys."

3. Tributary area.—The largest city on the river is Charleston, population 60,400, situated at the mouth of the Elk River, 58 miles from the mouth of the Kanawha. The other principal cities are South Charleston, population 5,900, located opposite Charleston; Montgomery, population 2,900, located 85 miles from the mouth; St. Albans, population 3,250, located at the mouth of Coal River, 46 miles from the mouth; and Point Pleasant, population 3,300, located at the junction of the Ohio and Kanawha Rivers. There are also many smaller places, industrial centers and mining towns that make the valley, especially in the upper part, thickly populated. The principal industries along the river are coal mining, the manufacture of chemicals and ferro-alloys, and oil refining. The valley from the head of the river to St. Albans is a highly industrial area. Below that point, the wider and fertile bottom lands are used mostly for agricultural purposes. Improved highways exist along both banks of the river. A branch of the New York Central Railroad follows the river all the way along the right bank and the main line of the Chesapeake & Ohio Railway is [fol. 643-43] along the left bank from the head of the river to a few miles below St. Albans.

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5. Prior Reports.

Description	Congressional documents				Annual report of the Chief of Engineers	
	House or Senate	Number	Congress	Session	Year	Page
Survey by Turpin and Hutton	.....	.....	.....	.....	1871	625 to 636.
Survey	Senate	25	42d	3d	1873	505 to 510.
Do	do.	25	do.	do.	1874	483 to 485, vol. II.
Do	do.	25	do.	do.	1875	90, vol. II.
Location of dams	do.	25	do.	do.	1876	163 to 165, pt. 2.
Profile of river	do.	25	do.	do.	1876	153 to 163.
Survey	do.	25	do.	do.	1876	163.
Location of dams	do.	25	do.	do.	1877	743 to 749.
Effect of freshets from New River	do.	25	do.	do.	1877	296 to 331 and 675 to 678.
Location of dams	do.	25	do.	do.	1877	61, 296, and 303.
Completion below Charleston	do.	25	do.	do.	1878	473.
Location of Dams 6 and 7	do.	25	do.	do.	1879	554.
Maps	do.	25	do.	do.	1880	689.
Location of Dam 2	do.	25	do.	do.	1880	681.
Maps	do.	25	do.	do.	1881	915.
Lock 2 to the falls	do.	25	do.	do.	1889	1951.
	House	305	58th	2d	1904	2587.
Survey by Board of Engineers:						
Proposed 9-foot project	do.	41	63d	1st	1913	1023, pt. 1.
Locks Nos. 2, 3, 4, and 5	do.	190	70th	do.	1927	1220, pt. 1.

6. In 1903 the district engineer at Wheeling, W. Va., reported favorably on improving with locks and dams the upper section of the river between Lock No. 2 and Kanawha Falls. This section has a fall of 20.5 feet in 5½ miles. The reviewing board of engineers reported adversely, stating that it did not consider it desirable for the United States to undertake the improvement. (See H. Doc. No. 305, 58th Cong., 2d sess.) In 1913 a preliminary examination of Kanawha River was made to determine the advisability of increasing the height of the locks and dams to make a 9-foot stage. The report was unfavorable to the improvement. (See H. Doc. No. 41, 63d Cong., 1st sess.)

[fol. 643-44] 7. Under date of January 19, 1923, the district engineer at Huntington, W. Va., submitted a preliminary examination report on the Kanawha River from the falls to Lock No. 5, as authorized by the River and Harbor Act approved September 22, 1922. In this report recommendation was made for a survey to determine the advisability of a modification of the existing project for that section of the river, with water-power development. The recomendation was approved by the Chief of Engineers and the survey ordered. Report on the survey was submitted by the district engineer at Huntington January 16, 1926, with recommendation that Locks and Dams Nos. 2 to 5, inclusive, be replaced with two high fixed dams with larger locks and with provisions for water-power development. A revised report was submitted March 14, 1927, with same recommendation as in original report. A supplemental report on this survey was submitted by the district engineer on December 19, 1927. Concurring with the Board of Engineers for Rivers and Harbors, the Acting Chief of Engineers has recommended the replacement of Locks and Dams Nos. 2, 3, 4, and 5 with two locks and dams, but retaining a project depth of only 6 feet at this time. The report is published in House Document No. 190, Seventieth Congress, first session.

8. Existing project.—Pursuant to act of Congress approved June 10, 1872, an examination and survey were made of the Kanawha River from Kanawha Falls to the mouth under the direction of the district engineer at Baltimore, whose report (Annual Report Chief of Engineers, 1875, vol. II, pp. 90-97) was referred to a special board in 1875. The district engineer suggested three plans by which

a channel depth from 6 to 7 feet could be obtained, viz: A series of stationary dams, movable dams, or the former in the upper and the latter in the lower section of the river. Chanoine-wicket movable dams were recommended by the board from the mouth to Paint Creek and fixed dams from there upstream unless it should be deemed advisable subsequently to make the whole or a part of them movable. The district engineer recommended that the first fixed dam be located near Brownstown (at existing Lock and Dam No. 5) and stated that "if it be deemed proper to suspend judgment upon the system of movable dams, I should prepare for a lock and dam of 14-foot lift, constructing it only to the height of an 8-foot lift and adopt it for temporary use as a movable dam until the question is decided" (vol. II, p. 92, Chief of Engineers Report 1875). Pursuant to action of the board and recommendation by the Chief of Engineers, the existing project was adopted in 1875 (Annual Report, pt. 2, pp. 90-98), which provided for the construction of 9 locks with movable dams and 3 locks with fixed dams. This project was later modified by reducing the number of movable dams to 8 (Annual Report for 1879, p. 550), and after 2 of the 3 fixed dams had been constructed the construction of the third (no. 1) was postponed until its necessity should become more apparent. Under this project and subsequent modification as described previously (see exhibit no. 6), 2 locks with fixed dams (nos. 2 and 3) and 8 locks with movable dams (nos. 4 to 11) were constructed, providing a navigable depth of 6 feet from the mouth to 88.8 miles above. Lock No. 2 was completed in 1887, no. 3 in 1882, nos. 4 and 5 in 1880, no. 6 in 1886, nos. 7 and 8 in 1893, and nos. 9, 10, and 11 in 1898.

[fol. 643-45] The total expenditures to June 30, 1932, over the whole river for new work under this project were $4,635,373.77, and for maintenance, $4,439,934.13. The approved maintenance cost for the whole project for the fiscal year 1933 is $246,118.92. The total expenditures to June 30, 1932, for new work on the section of the river covered by this report (Locks Nos. 6 to 11, inclusive) were $2,187,665 for the locks and dams, which includes the field costs only. Neither the exact total expenditures for these locks and dams nor for channel improvements for new work over this section are available but are approximately $2,700,000. The approved maintenance cost for the fiscal year 1933 for this section of the river is $178,500. The replacement

of Locks and Dams Nos. 2 to 5, inclusive, by two new, high-lift locks and dams, providing larger docks with a 9-foot navigable depth, was authorized by the River and Harbor Act of July 3, 1930. Construction of the twin locks at one site (Marmet) and of one of the twin locks at the other site (London) is practically completed. A contract has been awarded for the construction of the dam at the Marmet site, and bids will be opened October 15, 1932, for the construction of the other lock and the dam at the London site. The new locks will be 56 by 360 feet in available dimensions. The dams will each have five steel crest gates of the roller type, each gate 100 feet 3½ inches long by 26 feet high, mounted between concrete piers extending above high water, and effecting closure against a low concrete sill between the piers. The remaining six locks and dams of the existing project, nos. 6, 7, 8, 9, 10, and 11, in order from Charleston to the mouth of the river, are covered by this report. The dams are of the movable type, with navigation passes and regulating weirs of Chanoine wickets. The locks are single, hand operated, with mitering gates, and have available dimensions 55 feet wide by 313 feet long. About half the time the dams are down, during which periods navigation goes through the navigation passes.

9. Local cooperation.—No contributions have been made or work done on the Kanawha River, or rights of way, easements, or other rights or privileges furnished by local interests under prescribed conditions of local cooperation.

10. Other improvements.—Prior to March 3, 1869, small expenditures were made for improvements to the channel by the Kanawha board, a subsidiary of the James River and Kanawha Co. which to that date controlled the navigation rights on the Kanawha River by a charter from the State of Virginia. By act of March 3, 1869, of the General Assembly of the State of West Virginia, the rights of the Kanawha board were declared forfeited and the assembly created a board, also called the Kanawha board, for control, supervision, and collection of tolls on the Kanawha River. The expenditures made for improvements on the river by either of these boards are not available. Under original project adopted by the act of Congress approved March 3, 1873, an appropriation of $25,000 was made in 1873 and the same amount in 1874 for improvements to the Kanawha River in conjunction with the improvements under way by

the Kanawha board of the State of West Virginia. The latter year was also the last the State of West Virginia took any active part in the improvement of the stream. By act of December 21, 1872, the General Assembly of West Virginia ceded to the United States all the rights, privileges, improvements, etc. possessed by the State in the [fol. 643-46] Kanawha River. This offer was not accepted by the United States but it subsequently took over the entire supervision of the river.

11. Tributary waterways.—(See Exhibits Nos. 2 and 3).[1] No improvements have been made by Federal, State, or local interests to any immediately tributary waterways of the Kanawha River except in the Coal River which empties into the Kanawha River at St. Albans, W. Va. In this stream, eight small wooden locks and dams were constructed prior to 1856 by the Coal River Navigation Co., a corporation chartered by the State of Virginia March 17, 1849. Those locks and dams established slack-water navigation on the Coal River from its mouth to a point 34 miles upstream and were maintained until 1882 when they were abandoned. The locks and dams are now practically obliterated.

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[fol. 643-47] 13. Improvement desired.—A great deal of public interest has been aroused in an effort to obtain better navigation facilities in the lower Kanawha River, sponsored mainly by the Kanawha Valley Improvement Association, the membership of which contains most of those interested in the navigation of the Kanawha River. In spite of the present inadequate facilities, commerce has been growing, but its growth has not been in proportion to the industrial growth of the valley. Navigation interests on the Kanawha River claim that this is due to the lack of proper facilities and that if such were provided, a considerable increased commerce would develop. In connection with this prediction, attention is invited to the inclosed file of communications (exhibit No. 36)[1] received from owners of coal lands, water carriers, and others interested in

[1] Not printed.

the navigation of the river. From time to time this office has received complaints from those operating Kanawha River tows and these complaints maintain almost invariably that the cost of through commercial traffic over both the Kanawha and the Ohio Rivers is too high, due to the fact that the channel depth on the Kanawha is less than on the Ohio and that the locks are too small and too numerous.

14. The Kanawha River is a commercial as well as a physical tributary of the Ohio River. Coal produced in the valley is shipped down the Ohio and, because of its quality, will in the future probably also be shipped up the Ohio because of the diminishing supply of coal in the Pittsburgh territory suitable for metallurgical purposes, which coal is now shipped from mines to mills at low cost by water. Many large industrial plants are already located on the Kanawha River and more are in prospect. It seems logical to make the navigation facilities on the Kanawha River of such character that tows can readily navigate both it and the Ohio River without the necessity of reloading at any intermediate point in the journey. Actually, Ohio River [fols. 643-48–643-49] size barges and towboats do navigate the Kanawha but they can be loaded only partially, due to the 6-foot navigable depth. The larger, modern Ohio River towboats cannot pass through the locks with any of these barges. Great delays occur on account of the lockages required to pass one tow, the slowness of hand operation, and the many locks to pass through. The modified project above Charleston already authorized by Congress and now under construction, providing a 9-foot navigation and twin locks of proper size, will eliminate all of these difficulties in the upper river. The lower river below Charleston should be similarly modified as the existing project will not permit the full realization of the through commerce possible on the Kanawha and the Ohio Rivers.

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[fol. 643-50] 21. Commerce.—In the tabulations below are shown in detail the commerce for the years 1924 to 1931, inclusive, and the totals of the annual commerce for the years 1898 to 1931, inclusive.

[fol. 643-51] Calendar Year 1924

Classification	Tons moved on Kanawha River only		Tons moved on Kanawha and Ohio Rivers		Total tons
	Up	Down	In	Out	
Coal	200	50,155	5,248	648,000	703,603
Sand and gravel	.....	.....	163,758	.....	163,758
Gasoline and oil	.....	.....	9,157	2,703	11,860
Lumber	4	1,851	840	265	2,960
Steel, iron, hardware, and machinery	.....	.....	3,739	22	3,761
Chemicals	.....	.....	18	.....	18
Miscellaneous	709	1,004	9,760	3,740	15,213
Total	913	53,010	192,520	654,730	901,173

[fol. 643-52] Calendar Year 1931

Coal	.....	495,552	.....	855,313	1,350,865
Stone	480	.....	.....	.....	480
Sand and gravel	.....	[1]48,346	349,195	.....	397,541
Gasoline and oil	21,861	4,952	49,505	23,980	100,298
Lumber	1,127	.....	920	34	2,081
Steel, iron, hardware, and machinery	.....	.....	8,326	3,104	11,430
Miscellaneous	.....	.....	887	3,753	4,640
Total	23,468	548,850	408,833	886,184	1,867,335

[1] Moved on Kanawha and Elk Rivers.

[fol. 643-53] 22. Prospective commerce.—The Kanawha Valley has three sources of prospective river commerce. The one of the most permanent nature and likely to develop most extensively is the rapidly growing industrial area around the city of Charleston. In this valley large corporations have built up industrial plants which are now operating and should continue to expand and make this valley an important industrial area. The principal types of industries at present are chemical and metallurgical, but there are many other industries drawn to this valley by cheap coal and good transportation facilities, and these industries can reasonably be expected to require extensive transportation facilities, among which the river, if properly improved, could be made to serve as an extensive carrier of heavy freight. The second source of commerce is the large coal area that exists in this valley. This coal is of a high grade and is useful not only for fuel but for by-product and metallurgical purposes, and a modern navigation system would certainly carry a great deal of coal, not only to the markets which are now served by the coal trade but to the other markets where local supplies are becoming exhausted. The third source of commerce is the transportation of sand and

gravel from the Ohio River. Proper sand and gravel deposits do not exist on the Kanawha, and all of the construction activity in the Kanawha Valley is supplied with sand and gravel dug in the Ohio River. At the present time the coal traffic is the largest and most important part of the river commerce, and this product is especially suitable for carriage by water. The transportation of coal by river has been increasing steadily and is expected to continue. About 33,000,000 tons are produced in the fields tributary to the Kanawha River, of which 18,000,000 tons are shipped downstream, of which about 1,350,000 tons are shipped by water. Of the latter about 850,000 tons are destined to points out of the Kanawha Valley and the remainder is consumed in the valley. The market for the coal shipped by water out of the valley is in the vicinity of Portsmouth and Cincinnati, Ohio, and southern Indiana and Illinois. The rail coal market, in addition, includes the Great Lakes. From 1924 to 1931, the traffic on the river increased approximately 107 percent, or from 901,000 to 1,867,000 tons. In 1931 a new towing company, named the River Transportation Co., entered into a contract with one of the coal-producing companies on the river to transport a minimum of 400,000 tons of coal per year to Cincinnati and other points on the Ohio River. Plans were under consideration then also by a company organized as the Kanawha & Mississippi Coal Co., and by another one, the Koppers Co., a by-product coke-producing concern, to transport a total of more than 500,000 tons of coal annually out of the Kanawha River, but to date neither of these companies has made any actual shipments, due probably to the industrial situation.

23. All parties interested in the improvement of the Kanawha River were requested to furnish information as to the benefits that might be expected to accrue if a dependable 9-foot navigable depth were assured in the Kanawha River. The data furnished are appended to this report as exhibit no. 36,[1] and the table below is a summary of these reports.

[1] Not printed.

[fol. 643-54]

Class	Annual traffic		Savings in transportation charges per ton		Total predicted annual savings	
	Short tons	Ton-miles on Kanawha	Maximum	Minimum	Maximum	Minimum
Coal	11,540,000	875,933,000	$2.00	$0.50	$23,080,000	$5,770,000
Sand and gravel	86,000	4,988,000	1.50	.60	129,000	51,600
Oil and gasoline	130,000	2,600,000	1.90	1.90	247,000	247,000
Iron and steel	33,500	1,643,000	4.70	1.00	157,450	33,500
Ferro-alloys and raw materials	181,460	13,968,600	.496	.496	90,000	90,000
Chemicals	77,860	4,515,300	4.35	2.40	338,691	186,864
Miscellaneous	107,000	6,606,000	5.30	[1]3.00	567,100	321,000
Total	12,155,820	910,553,900	....	....	24,609,241	6,699,964

[1] 12.1 cents per ton less than present river haul.

In the data furnished by the river interests and summarized above, the coal that will be transported on the Kanawha River only was not separated from the total coal traffic predicted for the river, but savings of 63 cents per ton are claimed on such local traffic which at present is approximately 37 percent of the total coal shipped. Within the last few years this percentage has been increasing rapidly but will become a smaller proportion of the total traffic when the latter is materially increased.

The predicted traffic and the estimated savings furnished by the river interests and shown in the preceding table, are undoubtedly optimistic and the data are not sufficiently reliable on which to base the economic feasibility of the proposed improvements. They are given mainly as information and are not depended on solely for justifying the improvements presented later. Estimates of cost of transporting coal by water from the Kanawha River to Cincinnati, Ohio, under the existing project on the Kanawha River and under the plan of improvement recommended in this report are shown in accompanying Appendix No. 2, page 84. The savings shown are 16.3 cents per ton. This will be referred to later in this report under the heading "Discussions and conclusions."

24. Effect on rail transportation.—It is not expected that any permanent decrease in rail traffic would result from further improvement of the waterway. Some commodities produced in or brought to the valley can best be transported by rail and others by water. Savings in transportation costs by water might be shown for many commodities, but so many factors are involved that the results are often misleading. Both rail and water transportation have existed in the Kanawha Valley for many years. Rail facilities have been modernized, river facilities have not; still river commerce continues to exist and increase. A very large proportion of the freight in the valley is suitable for economical river transportation. If river haulage increases, other freight not suitable for the river will accrue to the railways due to increasing business caused by the river. Even if the shipping of low-rate coal is partly diverted to the river, high-rate commodities of other classes will go by rail and more than compensate for any such diversion.

25. Vessel traffic.—There are approximately 50 vessels navigating the Kanawha River. The actual number varies

[fol. 643-55] from time to time, as some are not regularly scheduled on the river and operate on it only as the business obtainable justifies. All of the vessels are of shallow draft, inland-waterways type, and mostly stern-wheel driven. The larger boats used for towing coal and similar heavy cargoes are mostly all steam-driven. These towboats usually handle six loaded coal barges downstream in the pools when the dams are up and a maximum of about 12 loaded coal barges in open river, and the same number of empty barges upstream under same conditions. The barges are 26 by 135 feet in size, 500-ton capacity. After passing into the Ohio River, these towboats can and frequently do handle larger tows. Somewhat smaller towboats and tows are used for transporting gasoline from the Ohio River and the considerable amounts of sand and gravel produced in the Ohio River and used along the Kanawha, mostly in the industrial section along the upper 40 miles. Smaller towboats, usually gasoline or Diesel-engine driven, are used for the smaller tows of coal consumed by the industries along the river.

The standard coal barges, as previously mentioned, are 26 by 135 feet, 500-ton capacity, and 6-foot draft. Most of these are of wood and old, the carriers hesitating to purchase the more modern steel barges pending the possible modification of the navigation project to provide a 9-foot navigable depth which, if made, would make the existing standard size and draft of barges obsolete. The gasoline brought up the river is in steel barges, the largest of which have 100,000 gallons capacity. Some steel barges of the Ohio River size (26 by 175 feet, 9-foot draft, and 1,000-tons capacity) are used on the river but only in connection with shipments to or from the Ohio River by carriers whose main business is on the Ohio River. In such cases, the full capacity of the barges cannot be utilized and for this and other reasons the barges are not economical for use on the Kanawha River.

There is at present only one packet boat operating on the river on a regular schedule. Other- occasionally operate on the river when the passenger or miscellaneous freight business is sufficient to justify it. There has been a gradual decline in the packet-boat commerce, accentuated in later years by the rapid increase of motor truck transportation due to the advent of improved highways.

The following table lists the present commercial vessels now using the Kanawha River:

(Table omitted)

[fol. 643-56] 26. Difficulties attending navigation.—Most of the river commerce that now uses the Kanawha River uses the Ohio River also and is under considerable handicap and cannot be expected to develop and increase if forced to use the present system of locks and dams in the Kanawha River below Charleston. The physical structures may last for a number of years but they discourage any increase in river commerce. The Ohio River commercial interests expect to use the 9-foot draft and the barges cannot be economically operated on a 6-foot draft. At the present time navigation interests are loading the barges to the extreme limit of navigable depth, which is about 7 feet, and they are willing to put up with the hazards and delays of grounding barges or tying up their plant when the channel fails to provide more than the 6-foot project depth. The present locks and dams are obsolete and inadequate for modern economical river transportation and no other type of transportation makes use of the Kanawha River. The Kanawha is not only a tributary of the Ohio River but it is practically an extension of the Ohio River for the same plant that uses the Kanawha goes into the Ohio regularly. Lock and Dam No. 6 has been in service 46 years, Nos. 7 and 8, 39 years, Nos. 9, 10, and 11, 34 years. These structures have received periodical replacement of parts that are likely to wear. They were built for operation under conditions which did not require the constant maintenance of pool levels and project depths. The dams having to be operated either from a maneuver boat or a light-service bridge, cannot be handled in swift water or ice so that there is constant annoyance to traffic on account of insufficient depth during periods when the dam must be maneuvered. The size of the locks is insufficient for the smallest economical tows used on the river with the result that any reasonable size tows must make several lockages for all the pieces to pass through the lock, causing considerable delay. This delay is further extended by the slowness of hand operation and delays are multiplied by the number of locks that must be passed through. Difficulties and delays to navigation are caused also by sand deposits on the dams and in the channel in

the lower section of the river, especially in the channel below Locks Nos. 10 and 11. These deposits occur suddenly [fol. 643-57] during freshets and to such an extent that the resulting navigable depth in the channel below Lock No. 10 may be only 2 to 3 feet, while below Lock No. 11 the channel at times is filled completely for a considerable distance. As much as 50,000 cubic yards of deposit left during freshets have had to be removed in one year from the channel in the lower approach of Lock No. 11.

Present river commerce on the Ohio River transportation system consists mostly of large tows of barges pushed by towboats. The standard coal barge is 26 feet wide by 175 feet long and usually loaded to draw about 8½ feet. Most of the tows consist of 10 of such barges arranged 4 wide (104 feet) and 3 long (525 feet), with a gap (duck pond) in rear of the tow for the towboat to be placed during lockages so the tow can pass through the 110- by 600-foot locks. Steel and miscellaneous products are transported mostly also in the same size of barges and tows. Six of such barges form a "Monongahela River" tow, arranged 2 wide (52 feet) and 3 long (525 feet), with towboat behind, passing through the twin locks 56 by 360 feet (in 2 sections simultaneously). The present lower Kanawha River locks, 55 by 313 feet, are not only too small in capacity but cannot be used to full capacity for barges of the standard size mentioned, with consequent delay and greatly increased transportation costs.

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28. A survey report on the Kanawha River from Kanawha Falls to Lock No. 5 was submitted in 1927 and is published in House Document No. 190, Seventieth Congress, first session. The survey report of this section of the river was made prior to and independent of the one here submitted for the lower section on account of the poor condition of Dams Nos. 2, 3, 4, and 5, which are older and of inferior construction to those in the lower section, which made their reconstruction or replacement necessary before those on the lower river.

29. Plan of improvement considered.—The congressional act quoted in paragraph 1 does not state specifically the object of the survey ordered for the Kanawha River. It is well understood, however, that the survey is the result of

a demand by navigation interests on the river that the [fol. 643-58] existing project from Lock No. 5 to the mouth be modified to provide a 9-foot navigable depth so the same depth will be available for commerce on the Kanawha as on the Ohio River over which most of the traffic on the former must pass. Larger locks also are desired by these interests, but it is believed the demand for them is not so strong as for a deeper channel. The desire for these improvements is based on the claim that the existing project on the Kanawha River is obsolete and inadequate for economical transportation with modern equipment and methods, and that it penalizes the commerce on this stream in competition with the commerce on the Ohio River. In the studies made of the proposed improvements to the existing project, various plans have been considered. A navigable depth of 9 feet could be provided and estimates of cost were made for three alternative plans, referred to in the following discussions as plans A, B, and C, by modifying or rebuilding the existing locks and dams.

Plan A

30. Under this plan it is proposed to raise the pool levels 3 feet by constructing new Chanoine wicket dams with the addition of bear-trap weirs, raise the lock walls, install power operation, add concrete guide walls for the locks, and improve the channel by dredging. It is not feasible to provide a 9-foot navigable depth in the Kanawha River by retaining both the existing locks and the movable dams, but it can be obtained by minor modifications of the locks and by constructing new and higher movable dams. To provide that navigable depth, the existing pool levels must either be raised or the bottom of the channel lowered, or a combination of the two. For reasons subsequently explained, the only practicable and also the most economical method is to raise the pool levels 3 feet.

31. Calculations made for stability of the lock walls in the existing project show that the limit of safety has been reached when there is a normal pool above the dam and low-water stage in the lock chamber, the weakest section of the walls being at the low-water elevation. This is the condition at extreme low-water stage when a lock and dam are in operation and the next dam below is down. It appears that the walls were designed to meet this condition. Both

the river and land walls of the locks are 5 feet above upper normal pools. Raising the pools 3 feet will necessitate raising the river walls at least 1 foot and the land walls 3 feet, assuming that the same freeboard as for the Ohio River locks will be sufficient. With the walls and the upper pools thus raised and with low-water stage in the lock chamber, the resultant forces on the walls fall slightly outside the middle third, somewhat less in the land than in the river walls. In these *cla*culations an upward pressure of water has been assumed as varying uniformly from one-third full head at heel to zero at the toe. Due to the type of masonry in the walls, no large tensile stresses in the masonry are permissible, but it is believed safe to raise the pools and the walls as proposed to provide the 3-foot additional navigable depth in the channel. Raising the land walls will necessitate also making fill for and replacing the esplanade paving back of the land walls. No change in design of gates will be necessary as they are of ample strength. Power operation instead of hand operation, however, should be provided for the gates and valves. The cost of this has been included [fol. 643-59] in the estimates. Increasing the height of the movable dams 3 feet necessitates entirely new structures. The wickets cannot be lengthened without corresponding increase in length of all the movable parts, modification of the hurters, and stronger anchorages. The old pass foundations, except at no. 11, are so shallow and so constructed that no parts of them could be incorporated in new structures. Parts of the weir foundations might be so used but that is doubtful on account of the character and type of construction. No allowance for such use has been made in the estimates.

32. To provide a 9-foot navigable depth by lowering the bottom of the channel would require only the lowering of the miter sills for the downstream lock gates, extending the gates down to the lower sills, and dredging in the channel, provided the existing movable dams could be retained. The modifications of the miter sills and the gates could be accomplished at small expense, but the cost of dredging in the channel would be very large. It is estimated that approximately 1,500,000 cubic yards of sand, gravel, clay, etc., and 200,000 cubic yards of rock would have to be removed. In addition to the first cost of this dredging, there would probably be a very high annual maintenance charge as for

a considerable distance in the lower end of the river the material in the river bed is of a light, sandy character, easily moved by the swift current at high stages and deposited in the channel. Frequent dredging probably would be necessary to maintain the channel. It is not feasible, however, to improve the existing project by lowering the bottom of the channel and retaining the existing movable dams because the pass sills of the dams are too high to give a 9-foot navigable depth over them when there would be that depth in the channel during the periods when the dams are down. The existing dams cannot be raised before the open river stage falls to about 6 feet and must be lowered when the river rises to about that stage. Therefore, even though there were 9 feet in the open channel on 6-foot open river stage, there would not always be sufficient depth over the pass sills to utilize the depth in the channel. In view of this, since the dams must, in any event, be reconstructed, regardless of whether the pool levels be raised or the bottom of the channel lowered, the raising of the pools and the lock walls is not only more economical, as it avoids the dredging of the channel, but also provides a much better channel and with less maintenance cost for dredging. By either method, a 9-foot navigable depth in the Kanawha River requires movable dams of about the same height above the sills as the standard type on the Ohio River.

Plan B

33. The proposed modification of the existing improvements under this plan is the same as under plan A except the addition of increasing the available length of the existing locks from 313 to 360 feet by increasing the length of the old walls. This would provide locks of the same size as the new Marmet and London Locks now under construction above Charleston except that the width would be 55 instead of 56 feet. One foot less in width should not be any real detriment to navigation, and the abandonment of the [fol. 643-60] old locks for the purpose only of obtaining such a small increase in width would not be justifiable. The standard width of both the Kanawha and the Ohio River barges is 26 feet, and two widths of these barges can pass through a 55-foot-width lock about as well as through locks only 1 foot wider. The only objection to providing the additional available length for the old locks is placing of

them out of commission during the reconstruction, with consequent obstruction to navigation.

Plan C

34. The proposed modification of the existing improvement under this plan is also the same as under plan A except the construction of new locks with available dimensions of 56 by 360 feet. Modification of the existing locks to provide this additional width is not feasible. It would require an extension of one of the lock walls and entire reconstruction of the other. While that probably could be done at less cost than entirely new locks, it would necessitate placing the locks out of commission at least a whole low-water season, which would be disastrous to the commerce on the river. No scheme can be considered the execution of which makes that necessary. Therefore, a modification of the existing project to provide a 9-foot navigable depth with locks of larger width and length requires entirely new structures at new locations. Possibly that would permit locating some of them more advantageously. The construction of new locks and dams at new sites would cause the least obstruction to commerce of any method of changing the existing project.

35. In comparing the value of a modified project in which the existing locks are retained without increase in size with one including new and larger locks, the dams to be rebuilt in either case, it must be taken into account that if the existing locks be retained it will not be possible, due to the resultant future interference with navigation, to provide larger locks in the future except at new locations and with new dams. Therefore, the necessary expenditures should not be made for new dams at the old sites if there is any possibility that locks of larger size may be necessary in the future. Should such larger locks be found necessary, the reconstructed dams, which probably would then still be in good condition, would have to be abandoned merely on account of necessary change in location of the locks. It is considered, therefore, that no expenditure for modifying the old locks is justifiable unless there is a reasonable certainty that the modified dimensions of these locks would suffice for a considerable time in the future.

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[fol. 643-61] 37. While the execution of plan A or plan B is possible, it could not be accomplished without considerable interference with navigation on account of the necessary changes in the locks. These plans are therefore considered impracticable and the type of improvement obtained would not justify the costs. None of these plans [fols. 643-62–643-67] provide reduction in the number of the locks nor obviate the inherent unreliability of a navigation system afforded by that type of movable dams, and except at an enormous cost for original and maintenance dredging for overdepth in the channel, would not provide the deep, wide, and reliable channels obtained by high dams the net cost of which, taking into account the reduced operating costs of the fewer locks and dams, is no greater than for the lower dams. The cost of plan C does not justify that plan. The entirely new locks would be preferable over the modified old locks in the other plans but in other respects it would not offer a better navigation project. The cost, including proper allowance for the large operating and maintenance costs, would exceed that of two high dams with twin locks hereinafter proposed.

38. To provide an economical and suitable navigation system on the lower Kanawha River commensurate with the existing and prospective commerce on the river, it is proposed to abandon all the existing lowlift locks with Chanoine wicket dams (nos. 6-11, inclusive), and substitute two high dams with twin locks, both locks at each dam to have available dimensions of 56 by 360 feet, and the dams to be non-navigable with full movable crests of the roller type. Twin locks are considered essential to avoid interruptions to navigation when a lock is out of commission due to accidents, general repairs, or for other causes. With the type of dam proposed, navigation must pass through the locks at all times. Dams with movable crests over their entire length and with sills near the river bed are necessary to pass flood discharges without unduly increasing the flood heights and causing unreasonable and excessive damage to property in the agricultural and industrial valley. Two plans for the proposed modification of the existing project are submitted. One, referred to hereinafter as plan no. 1, consists of two high-lift locks and dams of the type previously described, both of which are located in the Kanawha River. The other

plan, referred to hereinafter as plan no. 2, consists of the same upper lock and dam as in plan no. 1 but for the lower lock and dam in plan no. 1 is substituted a high-lift lock and dam, with same upper pool elevation, but located in the Ohio River about 13.5 miles below the mouth of the Kanawha River and 3,750 feet below existing Lock and Dam No. 26.

(NOTE.—Paragraphs 39 to 46, inclusive, dealing mainly with plan No. 1, which was not adopted, are omitted.)

[fol. 643-68] 47. Connection with the Ohio River.—It becomes more and more apparent as this subject is studied that the proper connection of the new navigation system of the Kanawha River to the Ohio River system is the most difficult part of the problem, as the navigation problems of the two rivers are inseparably bound together. The existing link binding the two river systems together is the backwater from the Ohio River Dam below the mouth of the Kanawha, which fills the gap between the lowermost Kanawha River Dam and the Ohio River. At present this backwater is only deep enough for a 6-foot project, and even this depth is difficult to maintain, due to the sand deposits made by Kanawha River rises. To secure a 9-foot project depth in this streteh of the lower river would involve a serious dredging problem, not only initially but repeated annually in greater or less degree, with certainty of interruptions to commerce. A high dam in the Ohio below the mouth of the Kanawha River would eliminate this problem, because its deep pool would provide ample navigable depths at this point under all conditions that would be encountered. The projected lowermost Kanawha River dam (Point Pleasant) would be also subject to difficulties of design, construction, and operation on account of Ohio River backwater at flood stages, which permits navigation [fol. 643-69] at times that would be impossible had the same stage been reached as a result of Kanawha River floodwaters. The poor foundations available in the lower Kanawha River, as previously discussed, further suggests that the elimination of a dam so difficult to construct and operate would be advantageous. The elimination of the serious dredging problem in the lower part of the Kanawha River and the elimination of the lowermost dam (Point Pleasant) as proposed in plan no. 1, are both made pos-

sible and feasible by the construction of a high dam in the Ohio River below the mouth of the Kanawha River. This Ohio River dam, combined with one new Kanawha River dam, would provide slackwater to the Marmet Dam, above Charleston, reducing the entire Kanawha River problem to the maintenance of three high dams (London, Marmet, and Winfield) with practically no dredging.

It is obvious that Congress intended that any study of the Kanawha River be made sufficiently comprehensive to include a combination of the Kanawha and Ohio Rivers navigation systems, as well as all other problems affecting the two rivers in common, as evidenced by section 3 of an act of Congress dated March 3, 1925, which directed an estimate of the cost of investigating various navigable streams, or their tributaries, whereon power development was feasible and practicable; and of formulating plans for the improvement of such streams for navigation, in combination with the development of power, with flood-control works, and with irrigation works. House Document No. 308, Sixty-ninth Congress, first session, contained the estimate asked for, and listed the streams to be considered. Section 1 of the River and Harbor Act of January 21, 1927, contained instructions to make the investigations of these streams and on certain additional streams. The Kanawha River (as well as the Ohio River) came under the purview of these acts. It is also evident that Congress intended as a result of a reexamination of the Ohio River navigation system made by the Ohio River board that the Ohio River navigation system be improved by the substitution of fixed dams for movable dams as authorized by an act of Congress dated July 18, 1918, as is evidenced by the following quotation from the act:

—That the Secretary of War is hereby authorized to modify the project for the improvement of the Ohio River in accordance with the report submitted in House Document No. 1695, Sixty-fourth Congress, second session.

The document referred to is the report of the Ohio River board which recommended "That the Secretary of War be given authority, if the same is not already possessed, to cause fixed dams to be built in the Ohio River wherever such fixed dams would be more advantageous than movable dams."

This study, designated as plan no. 2 in this report, was undertaken pursuant to the two expressions of the intent of Congress just quoted. The result of the study is a feasible and reasonable solution of the difficult engineering problem of providing a 9-foot channel in the Kanawha River, and is further supported by a favorable economic justification. Failure to present such an excellent solution of this problem to Congress would be performing less than full duty. A plan confined to the Kanawha River itself is presented in strict conformity with the requirements of Congress, but in lieu thereof, a new plan is recommended below as being much better physically, much more economi- [fol. 643-70] cal, more to the best interests of the United States to adopt, and more in keeping with the true intent of Congress. This plan is here described and designated as plan no. 2.

Plan No. 2. One Lock and Dam in the Kanawha River and One in the Ohio River

48. Location and description.—This plan substitutes for the Point Pleasant Lock and Dam (of plan no. 1) near the mouth of the Kanawha River, a high-lift dam in the Ohio River with the same upper pool elevation. The recommended location is 3,750 feet below existing Ohio River Lock and Dam No. 26, 13.5 miles below the mouth of the Kanawha River, and 279.2 miles below Pittsburgh, Pa. It is designated the "Gallipolis Lock and Dam" for the nearest city, Gallipolis, Ohio. This dam would create slack water reaching to the proposed Winfield Lock and Dam in the Kanawha, and raise the existing pool below Lock and Dam No. 23 in the Ohio River 2½ feet. Under normal pool conditions there would be no effect on Dam No. 23, and to obviate any difficulty in case of a high pool, the Bebout weir wickets can be readily replaced by wickets that trip at a higher stage as a matter of simple operating repair. The new dam will eliminate existing Locks and Dams Nos. 9, 10, and 11, Kanawha River, and Nos. 24, 25, and 26, Ohio River.

A stratum composed of hard sandy shale practically integral with a bed of dense sandstone and varying in thickness from 10 to 28 feet lies close to the river bed over the selected site. The top of this hard stratum varies from elevation 488 to 497 above mean sea level. This layer

is deemed suitable to withstand the superimposed loading of the proposed hydraulic structures although it has underneath it a thick layer of fairly soft variegated shale. The latter appears to be dense, watertight, and so well confined as to amply prove suitable for foundations. The contour of the river bank on the West Virginia side offers a very satisfactory location for the lock and for its approaches. The bank below the abutment on the Ohio side is of a [fol. 643-71] rocky nature, appearing on the surface to offer sufficient protection against scour from the discharge through the dam. It is proposed to construct a main lock of 110 by 600 feet available dimensions (regular Ohio River size) and an auxiliary lock 56 by 360 feet in available dimensions. The dam consists of 10 rolling-lift roller gates 30 feet high and 100 feet, 3½ inches long between piers, the gates at full opening providing a clearance of 5 feet above the maximum high water of 1913. The sill of the dam is near the natural bed of the river. The discharge section at high-water stages is reduced only by the piers and part of the locks as the latter are located partly in the existing river bank. The increase in flood heights resulting from the proposed works will be small. The lift of the locks will be 26 feet. The proposed height of the lock walls is 15 feet above normal upper pool, which will permit navigation to pass through the locks to a river stage of 45 feet above low water, which is the maximum stage the river can be navigated safely at the site.

* * * * * * *

[fol. 643-72] 51. Advantages of plan.—The construction of a lock and dam in the Ohio River as proposed under this plan instead of in the Kanawha River 3.8 miles from its mouth under plan no. 1, provides not only a much superior navigation project over both the lower Kanawha River and over the Ohio River section that is affected by the proposed improvement, but it is the only satisfactory solution of the modification of the existing project of the lower Kanawha River. In addition, as shown later in this report, it is also the better plan from an economic standpoint. Instead of an undependable channel in the Kanawha from its mouth to the proposed Point Pleasant Lock and Dam, resulting in occasional delays and losses to navigation, as explained in paragraph 47, the substitute lock and dam in the Ohio River will eliminate these hazards entirely. It will

also eliminate the improvement and maintenance dredging in the channel from the Point Pleasant Lock and Dam to the mouth and leave only one lock in the Kanawha River in the section covered by this report. In the Ohio River, it will provide wider and deeper pools over 48 miles of the river, eliminate 2 locks, and the pool level will be more regular and dependable than now maintained by the 3 movable dams. Under present conditions trouble is experienced in the operation of Dam No. 25, Ohio River, which is located only about 5 miles above the mouth of the Kanawha River. At times high water in the Kanawha River backs up the Ohio River to Dam No. 25, in consequence of which the Bebout weir wickets in that dam cannot be held up, with resulting loss of full pool above. At such times, also, the bear trap cannot be raised, increasing the difficulty of maintaining the pool above. Trouble is experienced also in the operations of Dams Nos. 26 and 27 due to accumula-
[fol. 643-73] tion of sand deposits in the Kanawha River below existing Dam No. 11 which is in the pool above Dam No. 26. When the channel there has less than the project depth, navigation interest demand that the pool level be raised above normal by carrying a high pool above Dam No. 26 in the Ohio River. This also causes high backwater below Dam No. 25 with the same results as previously explained. Also, when for the reasons mentioned a high pool is held above Dam No. 26 following the raising of the Ohio River dams in the locality after a rise in the river, the water held above Dam No. 26 causes a low pool above Dam No. 27. All of these troubles will be eliminated by the proposed new Gallipolis Lock and Dam. There will also be eliminated the cost of operating and maintaining existing Locks and Dams No. 26, 25, and 24, Ohio River, now amounting to about $165,000 per year, and maintenance dredging in the pools above these dams the cost of which is estimated at $50,000 per year after the contemplated channel of 12 by 500 feet is provided. The procurement of this channel is estimated to cost $834,000, which expenditure can also be eliminated by the Gallipolis Lock and Dam and applied as a credit to its construction.

* * * * * * *

[fol. 643-74] 54. Water power—At two of the three locks and dams proposed in this report (Winfield and Gallipolis), there are possibilities for power development, only one of them being comprised in plan no. 1 but both of them in

plan no. 2. Power can not be developed economically at the Point Pleasant Lock and Dam (plan no. 1) on account of backwater from the Ohio River which would greatly reduce and frequently eliminate the effective head at that site. Backwater from the Ohio River or high water in the Kanawha River, or a combination of both, would also reduce to a small extent the power output at the Winfield site which is 31.1 miles above the mouth of the river, but such reduction would not be very serious except for about 3 percent of the time. The proposed Gallipolis lock and dam in the Ohio River, with a maximum head of 26 feet, would permit utilization of a larger flow but it would be subjected to serious reduction in head for nearly 10 percent of the time from high water in the river. While it would not be possible to develop primary power at either the Winfield or the Gallipolis site, some of the deficiency of the power output could be supplied by any large power system from its other sources of power and in that way convert a large part of the power from these sites into primary power of fairly high value. An application from a large power company for power development at the new London and Marmet locks and dams in the upper Kanawha River is now pending before the Federal Power Commission. Owing to the higher head at the proposed Winfield site and much larger available flow at the Gallipolis site, it is believed that power development at those sites will be as attractive as at the London and Marmet sites in the upper Kanawha River although these sites are in an industrial area where there is a large market for electric power while the Winfield and Gallipolis sites are not so located and power developed there, for some years at least, would have to be transmitted for a slightly greater distance. At the present time, however, the cost of producing steam-electric power in this locality is so low that only hydroelectric power developments of the most favorable type economically can success- [fol. 643-75] fully compete with steam power and there is considerable doubt if hydroelectric developments at the proposed Winfield and Gallipolis locks and dams would be economically feasible under present conditions. In view of this situation, it is believed not justifiable to allow any credit on the cost of the construction of these dams from compensation that might be obtained from power developments.

56. Discussions and conclusions.—A capital investment by the Government of over $11,000,000 and an annual charge of over $170,000 must be compensated for by a corresponding public benefit, and the benefit in this case must be a sufficient decrease in cost of existing or an increased river commerce that will continue for the assumed minimum life of the navigation works, 50 years. The Kanawha Valley has two sources of commerce, both only partly developed. The first source is coal in the ground which is of such excellent quality, of such ample quantity, and so readily accessible that it will always be a source of fuel for steam, coking, byproduct, and domestic uses. The nearness of this coal to large industrial districts and thickly populated areas will assure a reliable and increasing market. The second source of commerce is the industrial development now taking place in the valley itself. Nationally known corporations, as well as local companies, are establishing and enlarging plants for the manufacture of many products, particularly chemicals and allied substances, and during the World War the Federal Government established two large plants in this valley. Data concerning the larger industries in the Charleston area of the Kanawha River Valley are appended hereto in exhibit no. 37.[1] The nearness to coal, to water power, and to markets makes it certain that this industrial development will be permanent and will increase. How much of such increased commerce will be carried on the river depends on the relative cost of water transportation as compared to other means. Since water commerce exists in this river, and is steadily growing, a sufficient justification for the improvement should be that water transportation will be so much cheaper in the largest item of commerce as to make reasonably certain that commerce will increase, and that the savings in transportation costs to the public will exceed the annual charges of the improvement paid by the Government. The railroads in the valley have modernized their trackage and equipment and have increased their coal traffic enormously. The river has not been modernized, but if improvements are authorized on the river equivalent to those already made on the railroads, it is certain that a great expansion in the present river coal traffic will result, without robbing the railroads of any of their present traffic or reasonable increases. This tendency

[1] Not printed.

is already evident, stimulated by the new construction in the upper river.

57. As plan no. 2 of the proposed improvements offers much the better project from the standpoint of both the [fol. 643-76] physical navigation facilities provided and the net cost of the project, the economics of proposed modification of existing lower Kanawha River navigation project will be presented for that plan only. In appendix no. 2 (p. 84) the cost of transporting coal from Dana, W. Va., on the Kanawha River, 63 miles above the mouth, to Cincinnati, Ohio, on the Ohio River is estimated at 89.5 cents per ton under existing conditions. This covers transportation only with no allowance ofr terminal, delivery or other charges. With the navigable depth increased from 6 to 9 feet, the capacity of the barges can almost be doubled; and with the larger twin locks and the number reduced from 6 to 1, and with deeper, wider and straighter channels, tows of larger size can be operated and at greater speeds. All of these factors will tend to decrease transportation costs. As shown in appendix no. 2, the estimated cost of transporting coal from Dana, W. Va., to Cincinnati, Ohio, is 73.2 cents per ton, a saving of 16.3 cents over existing cost. The present external coal traffic on the Kanawha River is approximately 800,000 tons per year on which, at 16.3 cents per ton, the saving would be $130,400, slightly less than the estimated annual charge of the new project as shown in paragraph 53 herein. In addition, there would be a saving in the transportation of approximately 400,000 tons of sand and gravel produced in the Ohio River and transported up the Kanawha to the industrial area at Charleston. These products are transported in smaller tows than of coal and the savings would be considerably smaller per ton but it should be not less than 5 cents per ton, which would amount to approximately $20,000 per year. There would also be some saving on the Ohio River commerce passing through the section of the Ohio River in the present pools above Dams Nos. 24, 25, and 26. Except for the sand and gravel previously mentioned, which is produced in this section and on which no savings would accrue that could be credited to the Ohio River, the main commerce over this section is in steel and oil products. It is difficult to estimate the saving per ton in this commerce, but it would be of some consequence as the two fewer locks to be passed through,

and the wider, deeper and straighter channel, would increase the safety and speed of the tows over this section of the river.

It is reasonably certain that the proposed improvements, if made, would result in a large increase in commerce on the Kanawha River, especially in raw commodities to and manufactured products from the industrial area along the upper part of the river. It is believed that the increase in the commerce would be larger proportionally for these products than in coal which is now the principal commodity transported on the river.

Navigation interests claim that an improved navigation project of the type proposed would result in large shipments of smokeless coal on the Kanawha and the Ohio Rivers to the metallurgical industries in northeastern Ohio. During normal industrial conditions, approximately 2,000,000 tons of smokeless coal are shipped by rail from the New River fields in West Virginia to these industries. These fi*l*eds are located within short rail haul to the head of navigation on the Kanawha River. It is claimed that this coal could be delivered to the Kanawha River by rail, transported down the Kanawha and up the Ohio, and then reshipped by rail to the consumers at a saving of not less than 50 cents per ton in transportation costs.

[fol. 643-77] If the commerce in coal increases from the present tonnage of approximately 800,000 to about 1,100,000 tons, which appears reasonable and conservative in view of the shippers' estimates of 11,540,000 tons in paragraph 23, the saving in transportation costs would equal the annual cost of the new project even if the savings on sand, gravel, and miscellaneous products were not considered. It is therefore believed that the proposed new project would be economically feasible if it caused but a moderate increase in river traffic.

58. Some of the interests now using or intending to use the Kanawha River slack-water system insist that a new project for the lower river should provide for locks of the Ohio River size (110 by 600 feet). Locks of that size instead of the smaller ones (56 by 360 feet) as recommended in this report and as under construction in the new project above Charleston, would undoubtedly be of benefit to navigation but not sufficient, it is believed, to justify the large additional cost of the locks and the abutment ends of the

dams. The twin locks and the piers of the roller-gate dams proposed in this report occupy a considerable part of the natural discharge section of the river, which section cannot be reduced beyond a limited extent without prohibitive increase in flood heights at the sites. To avoid this condition the reduction in discharge area due to the additional width of the larger size of lock must be compensated by locating either the locks or the abutment of the dams, or both, farther into the river banks. The cost incurred by the larger size locks is therefore increased not only by the additional cost of the locks but also by the largely increased excavation and protective works for the locks and the abutment ends of the dams.

59. Other benefits.—No other special or local benefits will accrue to the localities affected by these improvements except increased industrial activities with consequent increase in population and wealth, and a large permanent pool serving better the purposes of recreation, sewage disposal, and water supply. No national benefits of a direct nature can be expected.

60. Recommendation.—It is recommended that the existing project on the Kanawha River from Lock No. 5 to the mouth and providing a navigable depth of 6 feet be modified to provide a navigable depth of 9 feet by the construction of one 28-foot lift lock and dam in the Kanawha River, and one of 26-foot lift in the Ohio River below the mouth of the Kanawha, as set forth under plan no. 2 in this report. The new locks should be double, each 56 by 360 feet in available dimensions in the Kanawha River, and one main lock 110 by 600 feet and an auxiliary lock 56 by 360 feet in the Ohio River. The dams should be of a type permitting full discharge opening during floods. The estimated original cost of the proposed new project is $12,199,000 to which a credit of $834,000 is applied for elimination of contemplated channel improvements in the pools above existing Dams Nos. 24, 25, and 26, Ohio River, making the net cost $11,365,000. The necessity for the channel improvements will be eliminated if the proposed lock and dam in the Ohio River be constructed within the next few years. The estimated annual charge of the proposed new project is $173,245. An initial appropriation of $3,000,000 is recommended, and the remainder in approximately equal installments 1, 2, and 3 years following. It is further recommended that the locations, pool eleva-

[fol. 643-78] tions, and other features of the proposed works as set forth herein be considered as tentative only and that, if authorized by Congress, the final determination of these features be at the discretion of the Chief of Engineers.

Fred W. Herman, Major, Corps of Engineers, District Engineer.

[fol. 644] IN UNITED STATES DISTRICT COURT

[Title omitted]

NOTICE OF MOTION FOR INTERLOCUTORY INJUNCTION

To Hon. H. G. Kump, Governor of the State of West Virginia; Hon. Homer A. Holt, Attorney General of the State of West Virginia; Hon. Fred L. Fox, Individually and as State Tax Commissioner of the State of West Virginia:

You, and each of you, are hereby notified that on the 9th day of September, 1935, a verified bill of complaint of the above named plaintiff in the above styled cause against Fred L. Fox, defendant as aforesaid, was filed in the United States District Court for the Southern District of West Virginia, at Charleston, the said bill of complaint praying that the taxes assessed for the years 1933 and 1934 by the said defendant under the law of West Virginia, commonly known as the Gross Sales Tax Law, against the said plaintiff, and the acts of the said defendant in relation thereto, be adjudged null and void as repugnant to the Constitution and laws of the United States, and for other reasons set forth in said bill of complaint, and that the defendant, his assistants, agents, officers, servants, employees and attorneys be enjoined and restrained in the enforcement and execution of the provision of the said tax law of the State of West Virginia, involved herein in the collection of, and any attempt to, collect said taxes.

And you, and each of you, are hereby further notified that on the 16th day of September, 1935, at ten o'clock A. M. [fol. 645] or as soon thereafter as counsel may be heard, the undersigned counsel may be heard, the undersigned plaintiff, by its counsel, will appear before the United States District Court for the Southern District of West Vir-

ginia, at Huntington, and make application for an interlocutory injunction against the said Fred L. Fox, defendant, as aforesaid, his assistants, agents, officers, servants, employees and attorneys, enjoining and restraining them, and each of them, against the enforcement and execution of the provisions of the tax of the State of West Virginia, commonly known as the Gross Sales Tax Law, it being Article 13, Chapter 11, of the Code of West Virginia, 1931, and any and all amendments thereto, and from enforcing or taking any steps to enforce the collection of said taxes, until the final determination of this cause; and if for any reason said application for an interlocutory injunction cannot be heard or is not granted on the day last aforesaid, the plaintiff, by counsel, will, on said day move the Court for the issuance of a temporary restraining order against the defendant, his assistants, agents, officers, servants, employees and attorneys enjoining and restraining them against the enforcement and execution of the provisions of said tax law of the State of West Virginia against the plaintiff until the said application for an interlocutory injunction shall be heard and determined by the Court, as provided by law.

A copy of the bill of complaint, with its exhibits, is attached hereto and made a part of this notice.

Dated this 9th day of September, 1935, at Charleston, West Virginia.

The Dravo Contracting Company, a Corporation Organized and Existing Under the Laws of the State of Pennsylvania, Plaintiff, by Counsel, Moorhead & Knox, Koontz, Hurlbutt & Revercomb, Counsel for Plaintiff.

[fol. 646] MARSHAL'S RETURN

Received at Charleston, West Virginia, on the 9th day of September, 1935, the within notice with a copy of the bill of complaint, with its exhibits, and on the same day executed the same, within my said district, by delivering true copies of said notice with copies of the bill of complaint, with its exhibits, attached thereto, to the within named Honorable H. G. Kump, in person, the Governor of the State of West Virginia, Honorable Homer A. Holt, in person, the Attorney General of the State of West Virginia, and Fred L. Fox, in person, individually and as the State

Tax Commissioner of the State of West Virginia, respectfully, all at the State Capitol, Charleston, Kanawha County, West Virginia.

Witness my signature this 9th day of September, 1935, at Charleston, West Virginia, in my district aforesaid.

George P. Alderson, United States Marshal for the Southern District of West Virginia, by D. J. Rogers, Deputy Marshal.

[fol. 647] IN UNITED STATES DISTRICT COURT

[Title omitted]

MOTION FOR INTERLOCUTORY INJUNCTION—Filed September 16, 1935

Now comes the plaintiff, and upon its verified bill of complaint, with its exhibits, heretofore duly filed herein, and on notice duly given to the defendant, Fred L. Fox, the Honorable H. G. Kump, Governor of the State of West Virginia, and the Honorable Homer A. Holt, Attorney General of the State of West Virginia, service thereof being shown by the return thereon duly filed herein, files this its motion, pursuant to Section 380, Title 28, of the United States Code (Judicial Code, Sec. 266, amended), for the issuance of an interlocutory injunction against Fred L. Fox, defendant, his assistants, agents, officers, servants, employees and attorneys, upon the grounds and in the manner set forth in said bill of complaint, to prevent immediate, great and irreparable loss, injury and damage, particularly on the ground that the taxes assessed for the years 1933 and 1934 by the said defendant under the law of West Virginia commonly known as the Gross Sales Tax Law, it being Article 13, Chapter 11 of the Code of West Virginia, 1931, and any and all amendments thereto, and the acts of the said defendant thereunder, against the said plaintiff are repugnant to, and contrary to the Constitution of the United States, and amendments thereto, as more particularly set forth in the said bill of complaint.

The Dravo Contracting Company, a Corporation Organized and Existing under the Laws of the State of Pennsylvania, and a Citizen of Said State, Plaintiff, by Counsel, Moorhead & Knox, Koontz, Hurlbutt & Revercomb, Attorneys for the Plaintiff.

[fol. 648] IN UNITED STATES DISTRICT COURT

[Title omitted]

MOTION FOR TEMPORARY RESTRAINING ORDER—Filed September 16, 1935

Now comes the plaintiff, and upon its verified bill of complaint, with its exhibits, heretofore duly filed herein, and on notice duly given to the defendant, Fred L. Fox, the Honorable H. G. Kump, Governor of the State of West Virginia, and the Honorable Homer A. Holt, Attorney General of the State of West Virginia, service thereof being shown by the return thereon, duly filed herein, files this its motion, pursuant to Section 380, Title 28, of the United States Code (Judicial Code, Sec. 266, amended), for the issuance of a temporary restraining order against Fred L. Fox, defendant, his assistants, agents, officers, servants, employees and attorneys, upon the grounds and in the manner set forth in said bill of complaint, to prevent immediate, great and irreparable loss, injury and damage, particularly on the ground that the taxes assessed for the years 1933 and 1934 by the said defendant under the law of West Virginia commonly known as the Gross Sales Tax Law, it being Article 13, Chapter 11 of the Code of West Virginia, 1931, and any and all amendments thereto, and the acts of the said defendant thereunder, against the said plaintiff are repugnant to, in violation of, and contrary to the Constitution of the United States, and amendments thereto, as more particularly set forth in the said bill of complaint; and inasmuch as the written motion of this plaintiff heretofore [fol. 649] made for the granting and awarding of an interlocutory injunction was continued on the ground that said motion required a court consisting of three United States judges, as provided by Section 380, Title 28 of the United States Code, the plaintiff hereby makes this its application to this Court for a hearing on this cause for an interlocutory injunction in accordance with said law.

The Dravo Contracting Company, a Corporation Organized and Existing under the Laws of the State of Pennsylvania, and a Citizen of Said State, Plaintiff, by Counsel, Moorhead & Knox, Koontz, Hurlbutt & Revercomb, Attorneys for the Plaintiff.

[fol. 650] IN UNITED STATES DISTRICT COURT

[Title omitted]

ORDER RESTRAINING DEFENDANT, ETC.—September 16, 1935

This cause came on to be heard this 16th day of September, 1935, upon process herein issued and notice for an interlocutory injunction and restraining order duly served on the defendant, the Governor of the State of West Virginia, and the Attorney General of the State of West Virginia, respectively, in the manner and time provided by law, and upon the verified bill of complaint, with its exhibits, heretofore duly filed herein; and there were present the plaintiff, by its attorneys, Moorhead & Knox and Koontz, Hurlbutt & Revercomb, and also the defendant, by his attorney, Homer A. Holt, Attorney General of West Virginia.

The plaintiff tendered its written motion for an interlocutory injunction, and said motion is ordered filed; and it appearing from said verified bill of complaint that the plaintiff seeks to restrain and enjoin the enforcement, operation and execution of a statute of the State of West Virginia, and to restrain the defendant, as an officer of such state, in the enforcement and execution of such statute and in the enforcement and execution of an order made by said defendant, acting under said statute of such state, upon the ground of the unconstitutionality of such statute and the unconstitutionality of the said action of the defendant pursuant thereto, and that the application and motion for the interlocutory injunction must be entertained [fol. 651] and determined by three judges, as provided in Section 380 of Title 28, United States Code, Annotated, in the absence of two other judges, it is ordered that said motion and application for an interlocutory injunction, and action thereon by the Court, be continued until the assembling of a court of three judges, as provided by said section.

Thereupon the said plaintiff tendered its written motion for a temporary restraining order against the said defendant, as prayed for in said bill of complaint, and said motion is ordered filed; and it appearing from the facts alleged in the verified bill of complaint that irreparable loss or damage will result to the plaintiff unless a temporary restraining order is granted, the motion for a tempo-

rary restraining order is granted. It is accordingly adjudged, ordered and decreed that a temporary restraining order be, and the same is hereby, granted against Fred L. Fox, defendant as aforesaid, his assistants, agents, officers, servants, employees and attorneys, restraining; inhibiting and enjoining them, and each of them, from attempting to distrain upon or in any manner take or molest any of the property of the plaintiff, The Dravo Contracting Company, and from taking any further action against the said plaintiff under the law of the State of West Virginia commonly known as the Gross Sales and Income Tax Law, being Article 13, Chapter 11 of the Code of West Virginia, 1931, and any and all amendments thereto, and from enforcing or taking any steps to enforce, the collection of any taxes assessed under said law, until the application for an interlocutory injunction shall be heard and determined by the Court, as provided by law; but said temporary restraining order shall not be effective unless and until the plaintiff furnishes a bond with good surety thereon, in the sum of $140,000.00, as provided by law, to be filed in the office of the Clerk of this Court, at Charleston.

It is further ordered that upon bond being furnished by [fol. 652] the plaintiff, as aforesaid, an attested copy of this order be served on the defendant to be restrained thereby.

And the plaintiff having made its application for a hearing of this cause for an interlocutory injunction in accordance with Section 380, Title 28 of the United States Code, the time and place for a hearing on said application is taken under consideration until the further order of this Court.

And, on motion of the defendant by counsel, the time for the filing of motion to dismiss and answer of the defendant is extended until November 1, 1935.

Elliott Northcott, U. S. Circuit Judge, Sitting by Designation.

[fol. 653] IN UNITED STATES DISTRICT COURT

[Title omitted]

ORDER FILING ANSWER—October 26, 1935

This day came the defendant, Fred L. Fox, individually and as State Tax Commissioner of the State of West Vir-

ginia, by Homer A. Holt, Attorney General of West Virginia, his counsel, and tendered and asked leave to file his duly verified answer to the bill of complaint filed against him herein, which leave is granted and said order is accordingly ordered filed.

Enter.

W. E. Baker, United States District Judge for the Northern District of West Virginia, Sitting by Special Designation.

[fol. 654] IN UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA

In Equity. No. 3492

[Title omitted]

ANSWER—Filed October 26, 1935

To the Honorable George W. McClintic, Judge of Said Court:

The defendant Fred L. Fox, individually and as State Tax Commissioner of the State of West Virginia, for answer to the bill of complaint filed against him in the above-styled cause by the plaintiff Dravo Contracting Company, a corporation, says:

[fol. 655]

I

The allegations of paragraph "I" of the bill are admitted.

II

The allegations of paragraph "II" of the bill are admitted.

III

Answering paragraph "III" of the bill, the defendant denies that the plaintiff is threatened with the invasion and denial of any rights guaranteed to it by the Constitution of the United States and with irreparable injury, loss, or damage, but admits that a court of equity is the proper form for the consideration of the alleged wrongs of the plaintiff, and that if the allegations of the plaintiff's bill are true, which

the defendant denies, the plaintiff would be without adequate and complete remedy at law therefor.

IV

Answering paragraph "IV" of the bill, the defendant admits the allegations of clauses "(a)" and "(b)" thereof.

(c) The defendant admits that the allegations of the plaintiff's bill purport to submit questions arising under the Constitution and laws of the United States, but denies that the enforcement of the "West Virginia Gross Sales and Income Tax Law" (Article 13, Chapter 11, Official Code of West Virginia, 1931, as amended), constitutes the imposition by a state of a direct tax and burden upon interstate commerce and is violative of Article 1, Section 8, Paragraph 3 of the Constitution of the United States of America, or of any other provision of said Constitution.

[fol. 656] (d) The defendant admits that the allegations of the plaintiff's bill assert certain rights arising under the Constitution and laws of the United States of America, but denies that the enforcement against the plaintiff by the defendant of the taxes here involved is violative of Article I, Section 8, Paragraph 3 of the Constitution of the United States, as an imposition of a direct tax burden by the State of West Virginia upon the United States in the regulation, control and improvement of the navigable rivers under the power of the United States to regulate commerce between the States and with foreign nations, or in any other respect.

(e) The defendant admits that the bill charges an attempt by the State of West Virginia to legislate over property and places in respect of which the United States of America has exclusive legislative power and authority, but the defendant denies that the proposed enforcement of the tax here in question by the defendant against the plaintiff is violative of Article I, Section 8, Paragraph 17 of the Constitution of the United States, or of any other provision of said Constitution, for the reason that said tax would constitute legislation by a State over property and places in respect to which the United States of America has exclusive legislative power and authority, or otherwise, and denies that the property and places here involved are such property and places with respect to which the United States

of America has exclusive legislative power and authority, and denies that the enforcement of the taxes here involved constitutes the imposition of a state tax for the privilege of carrying on business within territory over which the United States of America has exclusive legislative power [fol. 657] and authority, and denies that the United States of America has such exclusive legislative power and authority over the territory here involved.

(f) The defendant admits that the plaintiff alleges that the enforcement against the plaintiff by the defendant of the tax statute here involved is violative of Section 1 of the Fourteenth Amendment to the Constitution of the United States in that such enforcement would abridge the privileges and immunities of the plaintiff as a citizen of the United States, and would deprive the plaintiff of its property without due process of law, and deny to it the equal protection of the laws; but the defendant denies that the enforcement of said tax statute against the plaintiff will in fact violate Section 1 of the Fourteenth Amendment to the Constitution of the United States in any particular, and says, especially, that the plaintiff is a corporation and is not a citizen of the United States within the meaning of said Section 1 of the Fourteenth Amendment relating to the privileges and immunities of citizens of the United States, and denies that the enforcement of said tax against the plaintiff will deprive the plaintiff of its property without due process of law or deny to it the equal protection of the laws.

V

The purposes of this suit are admitted to be as alleged in paragraph "V" of the bill. It is also admitted that "Plaintiff's Exhibit No. 1" is a true copy of the "Gross Sales Income Tax Law of West Virginia."

[fol. 658]

VI

The defendant admits that the plaintiff, the Dravo Contracting Company, has been for many years and is now engaged in the general construction business with headquarters in the State of Pennsylvania, and that the business operations of the plaintiff are conducted in various states throughout the United States, including the State of West Virginia.

The defendant denies that the plaintiff has not had or maintained, and does not now have or maintain any office or place of general business within the territorial boundaries of the State of West Virginia. To the contrary, the defendant alleges that the plaintiff has for several years been, and is now, doing extensive contracting work in the State of West Virginia, and has heretofore maintained and does now maintain in West Virginia an office or offices of such character as are necessary or convenient for its performance of its general contracting work in West Virginia. The defendant admits that the principal or chief office of the plaintiff is not now and has not been located in the State of West Virginia. The defendant says that it is true, as alleged in the plaintiff's bill, that the plaintiff has been duly registered, qualified, and licensed under the laws of the State of West Virginia to do business in the State of West Virginia as a foreign corporation since the year 1922, and has paid annually all license taxes and fees required of it for its simple admission to do business as a foreign corporation in the State of West Virginia. The defendant likewise admits that the gross sales, occupation, or privilege taxes here involved and referred to in the bill as privilege taxes, are in addition to the taxes upon the privilege or right of the plaintiff to do business in the State of West [fol. 659] Virginia as a foreign corporation, commonly called "corporation taxes," and referred to in the plaintiff's bill as "license taxes."

The defendant says that it is also true that the plaintiff has, prior to the years 1933 and 1934, made return of its gross receipts from business and contracts done in the State of West Virginia, including contracts with the United States of the same general character of those here involved, to the Tax Commissioner of the State of West Virginia, and has paid the Gross Sales Taxes thereon. The defendant says further that the Gross Sales Taxes which the plaintiff paid prior to the year 1933 were of the same type and character as the taxes here involved, except that the rate of said Gross Sales Taxes has been increased, though the tax of which the plaintiff complains was increased no more with respect to the plaintiff than with respect to any other person, firm, or corporation, domestic or foreign, doing general contracting business in the State of West Virginia.

The defendant admits that during the years 1933 and 1934 the business transacted by the plaintiff in the State of West Virginia consisted in part of business which the plaintiff refers to as "ordinary intra-state business," and in part of the performance of four contracts with the United States Government described in the plaintiff's bill of complaint. But the defendant says that the performance of said four contracts with the United States referred to in the plaintiff's bill was and is ordinary intra-state business, transacted and conducted within the State of West Virginia by the plaintiff.

[fol. 660] The defendant admits that the plaintiff made return of its gross receipts from its business transacted within the State of West Virginia other than the performance of the contracts with the United States Government for the years 1933 and 1934 and paid the Gross Sales Tax upon said earnings received from said activities other than its activities under the said contracts with the United States Government, and admits that in these returns made the plaintiff showed upon the face thereof that it had not included the receipts derived from its contracts with the United States of America.

The defendant says that he is without information of the reason why the plaintiff has refused to include in its said return the receipts of its contracts with the United States Government, but says that theretofore the plaintiff had paid the Gross Sales Tax imposed by the State of West Virginia upon the business of general contracting within the State of West Virginia upon the gross receipts of the plaintiff from other contracts with the United States Government of the same general character of those here involved. The defendant denies that the Gross Sales and Income Tax Law of the State of West Virginia is unconstitutional and void in so far as it attempts to impose a tax upon the gross receipts of the plaintiff's contracts with the United States Government or in any other respect material to this case.

[fol. 661] VII

The allegations of paragraph "VII" of the bill are admitted, except that the defendant is without information of the place at which the United States made the payments therein mentioned to the plaintiff.

VIII

The defendant admits the allegations of paragraph "VIII" of the plaintiff's bill, and that "Plaintiff's Exhibit No. 2" is a true and correct copy of the letter and assessments from the defendant to the plaintiff therein described.

IX

The defendant, upon information, admits the allegations of paragraph "IX" of the bill.

X

Answering paragraph "X" of the bill, the defendant admits the allegations thereof, except that he denies that the contracts made by the plaintiff with the United States of America were only to furnish labor and materials and to perform all work required for the construction of certain locks and dams for the improvement of navigation and transportation on the Kanawha and Ohio Rivers, but says that said contracts were for the construction by the plaintiff of such locks and dams and the performance of completed jobs of construction with respect thereto, as required by said contracts.

Defendant says that he is not informed of the place at which the representatives of the plaintiff actually signed the name and affixed the seal of the plaintiff to the several contracts here involved, or to any of them, but denies that the place of the making and entering into of said contracts [fol. 662] was Pittsburgh, Pennsylvania, but, to the contrary, says that the contracts were made and entered into at Huntington, West Virginia, by the acceptance there by the United States of America of proposals made there by the plaintiff upon invitations by the United States of America. And the defendant says that while he is without information with respect thereto, it may well be that after the proposals of the plaintiff had been accepted by the United States of America by its proper officers at Huntington, West Virginia, the written contracts were sent by the representatives of the United States of America to the plaintiff at Pittsburgh, Pennsylvania.

XI

Answering paragraph "XI" of the bill, the defendant denies that the locks, dams and appurtenant structures in

the bill mentioned and described were built and constructed and are being built and constructed under the direction and control of the United States, acting through the War Department thereof, and denies that said locks, dams, and appurtenant structures are works for which the plaintiff furnished and furnishes only labor and material. To the contrary, the defendant alleges that said locks, dams and appurtenant structures were built and constructed, and are being built and constructed by the plaintiff and that the obligations of the plaintiff under such contracts were and are not only to furnish labor and material, but, as well, to do all things required for the constructing of the several works therein described, and for the delivery to the United States of such completed works at the respective sites thereof pursuant to the terms of the several contracts made and entered into by the United States through the War Department thereof with the plaintiff.

[fol. 663] The defendant denies that the United States employed, placed and maintained in general charge of construction of said works a representative designated as the "contracting officer" and maintained at each of said places of construction a corps of civil engineers and representatives for the purpose of supervising, inspecting and directing the building of said locks, dams, and appurtenant structures, and for the purpose of inspecting and supervising the materials and the labor that went into the construction of the same, but, to the contrary, says that the construction of said works was in the general charge of the plaintiff, and, while admitting that there was and is on each job a contracting officer and under him a corps of civil engineers and representatives, says that said contracting officer is merely the representative of the United States of America in seeing that the plaintiff performed and performs the terms of the several contracts in accordance with the terms, conditions and specifications thereof, and in inspecting the materials and labor which enter into the construction of such work, as the work progresses, as a precaution against the incorporation therein of faulty materials or imperfect labor, to the end that the completed jobs may fully comply with the terms, conditions, and specifications of the several contracts with respect to which an inspection only after all of the work had been completed would be wholly insufficient to determine whether or not there

had been detailed specific compliance with the several terms, conditions, and specifications of the several contracts.

The defendant says that the United States can act only through its officers and representatives and that its contracting officer in connection with the construction of the [fol. 664] works mentioned and described in the bill acts on behalf of the United States in a capacity like unto that of a supervising architect representing the owner of a dwelling or business building which is being constructed by a contractor or builder under contract with the owner thereof, and that the duty of the contracting officer or of the architect is not to construct the works or building, but is to see that the contractor constructs the same for the owner in strict accordance with the terms, conditions, and specifications of the contract between the owner and the contractor or builder.

The defendant denies that in said contracts or in any of them the United States retained and exercised power, authority, or right to direct and control the plaintiff in the prosecution of the works mentioned and described in the several contracts in the manners and ways set forth in paragraph "XI" of the plaintiff's bill, and denies that in said Paragraph "XI" of the plaintiff's bill the said plaintiff has accurately or correctly summarized the various provisions and specifications of the contracts therein referred to. The defendant says that the several contracts have been filed with the plaintiff's bill as exhibits and that each of said contracts shows the respective terms thereof and speaks for itself. The defendant says that the contracts and specifications contain mention of the several items thereof apparently referred to by the plaintiff in said paragraph "XI" of the bill, and the defendant admits that the contracts and specifications set forth in much detail the methods by which the work shall be prosecuted, the materials which shall be used therein, and provides for thorough and complete inspection, examination and testing of all materials and work, and requires the employment of [fol. 665] competent labor and prescribes maximum hours of labor, but the defendant says that the United States retained no power, authority, or right to control the plaintiff in any manner in the performance of said contracts or of any of them other than to see that said contracts were per-

formed by the plaintiff in accordance with the terms and conditions and specifications thereof.

The defendant admits that the United States has caused and is causing said locks, dams, and appurtenant structures to be constructed by contract, and says that the plaintiff is an independent contractor for private or corporate profit with the United States for the construction of said locks, and dams, and appurtenant structures. The defendant denies that the plaintiff, an independent contractor, is an instrumentality of the United States of America.

XII

The allegations of paragraph "XII" of the bill are admitted.

XIII

Answering paragraph "XIII" of the bill, the defendant says that he is without information as to whether or not the plaintiff, in submitting its bids to the United States pursuant to the invitations to submit bids for the constructions of the several works referred to in said contracts, included therein any amount or sum for the payment of the taxes which the defendant has demanded of the plaintiff and of which the plaintiff here complains, but the defendant avers that the plaintiff had knowledge of the Gross Sales Tax law of the State of West Virginia, and prior to the making of any of said contracts here involved, had paid the [fol. 666] then applicable West Virginia Gross Sales Taxes upon the proceeds of other contracts of similar nature which the plaintiff had with the United States of America and performed within the State of West Virginia.

The defendant, upon information, further says that at the time of the letting of the first contracts for the construction of locks and dams upon the Great Kanawha River by the United States, after the amendment of the West Virginia Gross Sales Tax Law by Chapter 33, Acts of the Legislature, First Extraordinary Session, 1933, some one purporting to speak for the contracters interested therein by telephone called the defendant's office at Charleston from Huntington, West Virginia, and stated that the proposals for such contracts had to be submitted within the next thirty minutes and inquired whether the two per cent tax upon the gross income of contractors was applicable to the

gross income of contractors received from the United States for the performance of contracts for the construction of navigation locks and dams on the Great Kanawha River, and inquired what the attitude of the Tax Commissioner's Office was with respect to the enforcement of said tax against receipts from such contracts; that a representative of the defendant's office then and there stated that such tax was applicable to such gross income and that the defendant proposed to enforce collection thereof. The defendant, upon information, alleges that the plaintiff had knowledge of said telephone conversation at the time it made each of the contracts shown by the plaintiff's exhibits "5" and "6".

[fol. 667] The defendant denies that the bids submitted by the plaintiff to the United States were only for the furnishing of materials and labors in the construction of said works, but, to the contrary, says that said bids were for the construction of said completed works, including the furnishing of materials and labor and the doing of any and all other things necessary to the completion of said proposed works.

XIV

Answering Paragraph "XIV" of the bill, the defendant denies that the bids of the plaintiff were only for the furnishing of materials and labor for the construction of the works mentioned in the bill, and avers that the bids of the plaintiff were for the completed construction of said works, including the furnishing of materials and labor, and the doing of any and all things necessary to the completion of said works.

The defendant is without information of the place at which the plaintiff prepared its several bids and executed its several bonds accompanying the contracts mentioned in the bill when and after the plaintiff's bids therefor had been accepted, but avers that irrespective of the place at which the plaintiff signed said writings the said several contracts of the plaintiff with the United States of America were made at Huntington, West Virginia, where the proposals of the plaintiff were submitted to the United States of America and were by the United States of America accepted.

[fol. 668] XV

Answering Paragraph "XV" of the bill, the defendant on information admits that certain lock gates, roller dams, structural steel, machinery, and other apparatus and equipment used by the plaintiff in performing its several contracts with the United States of America in the State of West Virginia were manufactured and fabricated at the plaintiff's factories and mills at Neville Island in the State of Pennsylvania. The defendant is without information of the place or places at which such equipment was sampled, tested, and inspected, and, likewise, is without information of the place at which such equipment was, at the time the United States made part payment for said equipment or any part thereof; but the defendant denies, upon information and belief, that by virtue of the provisions of said contracts or of any of them, the title to such articles and equipment, or to any part thereof, became vested in the United States outside the State of West Virginia. The defendant says further that no clause or term of any of said contracts between the United States of America and the plaintiff required or requires that any part of said articles or equipment be manufactured, fabricated, sampled, or tested, inspected, or delivered at or from any place outside the State of West Virginia, and says that all that said contracts or any of them required or requires was and is the delivery of said equipment to the United States of America in the completed work at the several places of operation, all within the State of West Virginia, and suitable opportunity for inspection.

[fol. 669] The defendant is without information of what materials, such as cement, sand, lumber, bolts, rivets, steel, tools, implements, cables, machinery, or other materials and equipment, if any, were purchased by the plaintiff from persons outside of the State of West Virginia, and is without information of where such materials were stored outside the State of West Virginia, if at all. Likewise, the defendant is without information of the various river craft owned or leased by the plaintiff for use in the construction of said locks and dams and appurtenant structures. And the defendant is without information of the transportation by rail or upon navigable waters of such articles so manufactured or purchased and repair and replacement parts

therefor, and of the movement of such barges, dredges, derrick boats, and other craft from other states to places in the State of West Virginia. Defendant is likewise without information of the number, if any, of experienced and skilled workmen regularly employed by plaintiff, or otherwise, outside the State of West Virginia, and is without information of the plaintiff's having brought such persons into the State of West Virginia for use in the performance of said contracts between the plaintiff and the United States of America because of the particular skill or fitness of such persons, or otherwise.

The defendant admits that if the plaintiff either manufactured or procured outside the State of West Virginia machinery, equipment, supplies, and the like, and procured boats, barges, derricks and other machinery outside the State of West Virginia, and employed and hired workmen outside the State of West Virginia, and transported all of the same into the State of West Virginia, the act of such transportation constituted an act in interstate commerce; but the defendant denies that he has required any tax from [fol. 670] the plaintiff for the transportation of such materials, machinery, equipment, supplies, or persons, into the State of West Virginia from other states, and says that the tax which he has required of the plaintiff is not a tax for the bringing of materials, equipment, supplies, and persons into the State of West Virginia from without said State, but is for the carrying on of the business of general contracting within the State of West Virginia, irrespective of the places from which the materials, machinery, equipment, and persons used therein have been obtained.

The defendant denies that the gross income from the acts of the plaintiff in constructing the locks, dams, and appurtenant structures within the State of West Virginia under the said contracts with the United States of America constitutes gross income from interstate commerce or from things done by the plaintiff outside the State of West Virginia, even though it were true as alleged in the plaintiff's bill, and which the defendant denies herein, that approximately sixty per cent of the entire gross income of the plaintiff from said contracts was expended by the plaintiff for materials and equipment outside the State of West Virginia. The defendant denies that approximately sixty per cent of the entire gross income received by the plaintiff

from said contracts was received by the plaintiff from acts performed and things done by the plaintiff constituting interstate commerce or entirely outside the State of West Virginia, or either of them.

XVI

The defendant denies that the acts performed and things done by the plaintiff in the performance of its contracts with the United States of America in the bill referred to, [fol. 671] including the manufacture, purchase, and storage of articles, materials, and equipment, and the transportation thereof into the State of West Virginia, the leasing of various river craft, the movement of said river craft, owned or leased by the plaintiff, between other states and the State of West Virginia, and the transportation of workmen into the State of West Virginia, as set forth in paragraph "XV" of the bill, together with the placing, building, and erecting of said materials, equipment and machinery into the said locks and dams in West Virginia, were continuous, uninterrupted, and related acts done in the performance by the plaintiff of the single contract obligation, that is to say, the furnishing of the materials and labor and work for the construction of said locks and dams, as provided for in said respective contracts with the United States of America, but, to the contrary, avers that the said respective contracts of the plaintiff with the United States of America did not specify the places from which any such materials, equipment, machinery, or labor should be procured, but merely required the furnishing of said materials and labor in the erection of such locks, dams, and appurtenant structures by the plaintiff within the State of West Virginia, and that such several and disconnected acts of interstate commerce as may have resulted from the plaintiff's preparation to perform in the State of West Virginia its said several contracts with the United States of America were wholly disconnected therefrom and independent thereof and that the defendant has not required or sought to compel the plaintiff to pay to the State of West Virginia any tax for the purchase or lease of any of such materials, [fol. 672] machinery, equipment or supplies without the State of West Virginia or upon their transportation into the State of West Virginia.

XVII

Answering paragraph "XVII" of the bill, the defendant admits that the gross income received by the plaintiff from the United States under said contracts was the agreed compensation paid the plaintiff by the United States by the terms of said contracts for all and everything done by the plaintiff in the performance of its said contracts. But the defendant denies that such gross income by the terms of such contracts covered the costs and expenses of all acts performed and things done by the plaintiff in the performance of said contracts. The defendant says that the United States under such contracts did not purport to pay the plaintiff for the manufacture, purchase, and storage of articles, materials, and equipment, or for the transportation thereof into the State of West Virginia or elsewhere, or for the leasing of river craft or for the movement of the same between other states and the State of West Virginia, or for the transportation of workmen into the State of West Virginia, or for the placing, building, and erecting of the materials, equipment, and machinery at the respective sites of the works and structures; but the defendant says that under the said contracts the United States undertook and undertakes to pay the plaintiff for the completed jobs of erecting the locks, dams, and appurtenant structures.

The defendant denies that the performance by the plaintiff of the several contracts with the United States in the State of West Virginia constitutes, in whole or in any part thereof, commerce among the several states or transactions entirely outside of the State of West Virginia.

[fol. 673] The defendant admits that the portion of the gross receipts for the various items of material and labor entering into the various units designated in said schedules found in the several contracts between the plaintiff and the United States of America are not separated or segregated with respect to the original cost of said materials to the plaintiff, either within or without the State of West Virginia, or with respect to the cost of transportation thereof into the State of West Virginia, if acquired from without the State of West Virginia, or with respect to the cost of transportation of workmen into the State of West Virginia as distinguished from the cost of placing, building, and erecting the materials, equipment and machinery after the same has arrived within the State of West Virginia, but

says that the United States of America did not specify from whence such materials, machinery, equipment, and labor should be procured and was and is not interested in from whence the same might be procured so long as the specifications with respect thereto were complied with, other than that certain of said contracts provided that local labor should be utilized in so far as it were reasonably possible.

The defendant likewise admits that the applicable provisions of the Gross Sales and Income Tax Law of the State of West Virginia contain no provision for the separation of items making up such gross income, and says that there is no occasion for the separation of such items since the West Virginia Gross Sales and Income Tax Law is not applicable to transactions had without the State of West Virginia, or to transactions in interstate commerce.

[fol. 674] The defendant further avers that the performance of the contracts with the United States of America by the plaintiff and the construction of said locks and dams and appurtenant structures within the State of West Virginia constitute purely intra-state transactions and are not in whole or in any part transactions in interstate commerce or transactions without the State of West Virginia, whether or not the plaintiff procures the materials, labor, machinery and equipment necessary to the performance of said contract from within or without the State of West Virginia.

XVIII

Answering paragraph "XVIII" of the bill, except as in this paragraph hereinafter stated, the defendant admits that the United States of America entered into the said contracts with the plaintiff pursuant to the powers granted the Federal Government by the Constitution of the United States under subdivision 3, Section 8, Article I of the Constitution of the United States, being the power to regulate commerce with foreign nations and among the several states. The defendant denies that said constitutional provision grants the incidental power to control, regulate, and improve the navigable streams of the country, but admits that such incidental power is granted to the extent that it is necessary to regulate commerce with foreign nations and among the several states. The defendant admits that under Subdivision 17, Section 8, Article I of the Constitution of

the United States, Congress has the power to exercise exclusive legislation over all places purchased by the United States by the consent of the legislature of the state in which the same shall be for the erection of needful buildings. The defendant further admits that the legislature of the State of West Virginia has given its consent to the acquisition by the United States within the State of West Virginia [fol. 675] of lands for locks, dams, and works for the improvement of navigation of any water course, and for other purposes, but the defendant expressly denies that such locks, dams, and appurtenant buildings are needful buildings within the meaning of said Subdivision 17, Section 8, Article I of the Constitution of the United States, and expressly denies that with respect to such lands as the United States may have acquired in connection with the particular works here involved the Congress has the power to exercise exclusive legislation, and expressly denies that the legislature of the State of West Virginia has consented that the Congress exercise exclusive legislation over all or any of the places here involved, and, on information, denies that the United States has purchased all of the lands used and occupied by the plaintiff in the performance of its said several contracts with the United States. And the defendant avers that such jurisdiction as the United States may have over the lands occupied by such locks and dams and appurtenant structures is only concurrent with the jurisdiction of the State of West Virginia, and that such concurrent legislative powers as the United States may have with respect to such land and sites on which such locks, dams, and other appurtenant structures have been constructed and are being constructed, are not exclusive of the power of the State of West Virginia to impose upon and collect from those who as independent contractors contract with the United States of America for profit for the construction of such locks, dams and other appurtenant structures, a nondiscriminatory tax applicable alike to all persons, firms, and corporations engaging in the general contracting business within the territorial limits of the State of West Virginia, irrespective of the person, firm, corporation, or government with which such contracts may be entered into, and for which performed.

[fol. 676] Except as hereinafter stated in this paragraph, the defendant admits that the United States has authority, under the so-called commerce clause, being Subdivision 3,

Section 8, Article I, of the Constitution of the United States, relating to the regulation of commerce with foreign nations and among the several states, to enter into the several contracts with the plaintiff, and that the causing of said locks, dams and appurtenant structures to be constructed by contracts with the plaintiff is and was a proper exercise of proper governmental functions of the United States of America, but expressly denies that the Congress of the United States of America has the exclusive right to legislate with respect to places and sites upon which said structures were and are being erected.

Further answering paragraph "XVIII" of the bill, the defendant says that he is informed, believes, and therefore alleges that the several contracts of the plaintiff with the United States provided and provide for the construction by the plaintiff of certain works and structures not constituting a part of the locks and dams necessary or needful for the improvement of navigation upon the Great Kanawha River, but for use in the commercial development and distribution of hydroelectric energy or water power, and that the United States has entered into contracts with the Kanawha Valley Power Company, a West Virginia corporation, for the development of large water power by the use of such works and structures at the Marmet and London Dams, and is negotiating such a contract with said company for the commercial development of water power at the Winfield Dam; that the Kanawha Valley Power Company is a subsidiary and instrumentality of the Appalachian Electric Power Company a public utility corporation engaged in the commercial manufacture, distribution and sale of electric [fol. 677] power throughout Southern West Virginia and parts of Virginia and Kentucky; that by such contracts and proposed contracts between the United States and the Kanawha Valley Power Company the said Kanawha Valley Power Company is required to pay large sums of money to the United States for the use of such works and structures and for the privilege of developing such water power for commercial purposes upon such property and lands as the United States has acquired in connection with the construction of such locks and dams and appurtenant structures involved in the several contracts between the United States and the plaintiff.

The defendant on information denies that the United States has a lawful right and power under the commerce

clause of the Federal Constitution or under any other clause thereof, to engage in the commercial production, distribution, and sale of hydroelectric energy upon the Great Kanawha River, or to build works and structures therein for lease or license for compensation to any person, firm, or corporation therefor as a governmental activity. The defendant says that if the United States has any such power and authority it is not a governmental power or authority but is a mere proprietary power or right in the exercise of which the United States acts as any private person, firm, or corporation. The defendant denies that the commercial production, distribution, and sale of hydroelectric energy is a purpose for which it was contemplated by Clause 17, Section 8, Article I, of the Constitution of the United States that the United States might purchase lands and places from the persons owning the same over which Congress should exercise exclusive legislation. The defendant denies that the State of West Virginia, by its legislature, has consented to the purchase by the United States of lands in West [fol. 678] Virginia for the purpose of the commercial development, transportation and sale of water power or of leasing or licensing such land and places to others for the commercial development of water power, and denies that the legislature of the State of West Virginia has consented that the United States hold in West Virginia any lands and places for such purposes over which the Congress shall have the power to exercise exclusive legislation.

XIX

The allegations of paragraph "XIX" of the bill are admitted.

XX

Answering paragraph "XX" of the bill, the defendant admits the allegations thereof, except that he expressly denies that the furnishing of labor and material for the construction of locks and dams and appurtenant structures by the plaintiff as here involved, is in itself, interstate commerce, and denies that the works for the commercial development of water power constructed under said contracts are necessary instrumentalities in the maintenance, improvement and advancement of navigation upon the Kanawha River or were constructed for that purpose.

XXI

Answering paragraph "XXI" of the bill, the defendant says that the State of West Virginia has duly and lawfully given its consent to the acquisition by the United States of lands or sites for, among other things, locks, dams, or works for the improvement of the navigation of any water course, and has ceded to the United States concurrent jurisdiction with the State of West Virginia on and over any land so acquired by the United States, but has reserved over such [fol. 679] land the right to execute process, civil or criminal, and such other jurisdiction and authority over the same as is not inconsistent with the jurisdiction ceded to the United States by virtue of such acquisition. On information and belief, the defendant denies that all of the lands occupied by said locks and dams and appurtenant structures were acquired by purchase by the United States from the persons owning the same, and denies that all of the work of erecting said locks and dams and appurtenant structures under the contracts of the plaintiff, as aforesaid, with the United States, was performed upon lands purchased by the United States of America from the persons owning the same, and denies that the United States has exclusive jurisdiction over any of said lands and sites upon which any of the work of the plaintiff in constructing such locks and dams and appurtenant structures was performed.

XXII

The allegations of paragraph "XXII" of the bill are admitted.

XXIII

Answering paragraph "XXIII" of the bill, the defendant admits that the Gross Sales Tax Law of the State of West Virginia found in Article 13, Chapter 11 of the Code of West Virginia, as amended, was enacted for the express and sole purpose of providing revenue for the State of West Virginia and not as a regulatory measure, and that the revenues realized thereby become a part of the general fund of the State of West Virginia and are for the general purposes of the State government.

The defendant admits that said Act contains no provision for the separation or segregation of gross income de-

rived from intra-state business from gross income derived [fol. 680] from interstate business, or from transactions entirely outside of the State of West Virginia in so far as the business of the plaintiff is concerned, but says that there is no occasion for such separation since the said Gross Income Tax is not applicable to income derived from interstate commerce or from transactions conducted entirely outside the State of West Virginia. But the defendant denies that the transactions of the plaintiff resulting in the gross income against which the defendant has assessed the Gross Sales Tax of West Virginia constitute in whole or in any part interstate commerce or transactions entirely without the State of West Virginia. The defendant says that it is true that the said Gross Sales Tax is in addition to various other taxes for the benefit of the State of West Virginia levied on property real and personal.

The defendant says that it is likewise true that in the event the taxpayer fails or refuses to make a return, either in whole or in part, the assessment of the tax by the Tax Commissioner is final in the absence of judicial review.

XXIV

The allegations of paragraph "XXIV" of the bill are admitted, except that the defendant is without information of whether or not the only property owned by the plaintiff in West Virginia at the times mentioned was that used in the construction of said locks and dams.

XXV

The defendant denies each and every allegation of paragraph "XXV" of the bill.

[fol. 681]

XXVI

The allegations of paragraph "XXVI" of the bill are denied.

XXVII

Answering paragraph "XXVII" of the bill, the defendant denies that his collection of the tax complained of by the plaintiff will cause the plaintiff any irreparable loss, damage, or injury, and says that the collection of such tax is lawful, and that the collection of the lawful tax from the plaintiff constitutes no legal loss, damage, or injury to the plaintiff.

The defendant says that unless he is enjoined and restrained from so doing, he will proceed to collect the said taxes, assessed by him against the plaintiff in so far as it is within his legal power.

Defendant says further that it is true as alleged in paragraph "XXVII" of the bill: (a) that the said tax complained of is a debt due to the State of West Virginia and a lien upon the property of the plaintiff of like priority as the lien of a general property tax; (b) that the said act provides statutory penalties for the default or failure of the plaintiff to make payment of the taxes assessed against it thereunder, but he denies that such penalties are heavy; (c) that the act authorizes him as Tax Commissioner, to distrain upon the goods, chattels or intangibles represented by negotiable evidence of indebtedness of the plaintiff for the amount of all taxes and penalties accrued and unpaid under said act; (d) he is without information whether distraint upon the property of the plaintiff by him for the purpose of collecting said tax would materially interfere [fol. 682] with the performance by the plaintiff of any work under any of its contracts with the United States Government; (e) he admits that in the absence of judicial review, his assessment of the tax against the plaintiff for the years 1933 and 1934 is final; (f) he denies that the assessment against the plaintiff of the tax complained of on the plaintiff's gross income from its contracts with the United States government is void and illegal, and denies that the said statute under which the same was assessed is inapplicable to that portion of plaintiff's gross income derived from contracts with the United States government. He admits that the remedies for errors and irregularities provided for in said statute are inapplicable where the taxpayer denies the authority of the State of West Virginia to impose and collect such tax; (g and h) he admits that there is no full, adequate, and complete remedy whereby the plaintiff can compel repayment to it of any money paid as taxes to the defendant, whether said taxes be paid voluntarily by the plaintiff or be collected from the plaintiff, but he denies that he is threatening to illegally collect any tax from the plaintiff in any manner.

XXVIII

Answering paragraph "XXVIII" of the bill, the defendant says that he is without information whether the assess-

ment of such taxes by him or by any successor to him as State Tax Commissioner will lead to multiplicity of suits.

XXIX

The defendant admits that the plaintiff has no full, complete, and adequate remedy at law for the redress of its alleged wrongs.

[fol. 683] Wherefore, having fully answered, the defendant prays judgment that the plaintiff's Bill of Complaint be dismissed.

Fred L. Fox, Individually and as State Tax Commissioner of the State of West Virginia, by Counsel, Homer A. Holt, Attorney General of West Virginia; Ira J. Partlow, Assistant Attorney General of West Virginia, Solicitors.

[fol. 684] *Duly sworn to by Fred L. Fox. Jurat omitted in printing.*

[fol. 685] In United States District Court

[Title omitted]

Notice of Hearing

To Hon. H. G. Kump, Governor of the State of West Virginia; Hon. Homer A. Holt, Attorney General of the State of West Virginia; Hon. Fred L. Fox, Individually and as State Tax Commissioner of the State of West Virginia:

You, and each of you, are hereby notified that on the 8th day of September, 1936, the plaintiff expects to be heard by the United States District Court for the Southern District of West Virginia upon its application for an interlocutory injunction, as prayed for in its bill of complaint, in this pending cause, of which application you have heretofore been given notice, this proceeding being under Section 266 of the Judicial Code of the United States (Section 380, United States Code Annotated); the said hearing to be had at ten o'clock, A. M., on September 8, 1936, or at an hour as soon thereafter as the Court shall determine to proceed therewith, or on such date thereafter to which the Court

may continue said hearing; said hearing to be in the court room of the United States District Court for the Southern District of West Virginia, at Charleston, West Virginia.

The Dravo Contracting Company, a Corporation, Plaintiff, by Counsel, Moorhead & Knox, Koontz, Hurlbutt & Revercomb, Counsel for Plaintiff.

[fol. 686] MARSHAL'S RETURN

Received this writ Charleston, West Virginia, on the 3rd day of September, 1936, and served the same upon the within named: Hon. H. G. Kump, Governor of the State of West Virginia; Hon. Homer A. Holt, Attorney General of the State of West Virginia; Hon. Fred L. Fox, individually and as State Tax Commissioner of the State of West Virginia, on the 3rd day of September, 1936, by delivering to each of them in person on that day a true copy of the same at Charleston, West Virginia.

George P. Alderson, United States Marshal, by J. F. Hoffman, Deputy.

[fol. 687] IN UNITED STATES DISTRICT COURT

[Title omitted]

ORDER OF SUBMISSION—September 11, 1936

This cause came on this eleventh day of September, 1936, to be heard before the District Court, consisting of Honorable Elliott Northcott, United States Circuit Judge, Honorable H. H. Watkins, United States District Judge, and Honorable George W. McClintic, United States District Judge, convening under Section 266 of the Judicial Code of the United States; the plaintiff and defendant being present by counsel, this cause was heard upon the Bill of Complaint and exhibits and Answer heretofore filed herein and upon notice, as provided by law, to the Governor and the Attorney General of the State of West Virginia, and Fred L. Fox, individually and as State Tax Commissioner, defendant herein, of an application for an interlocutory injunction and upon a written stipulation of the evidence with all Appendices mentioned therein, to-wit, Appendices A, B, C, C-1, D, D-1, E, E-1, E-2, and F, which stipulation

and appendices are ordered filed and are to be taken and considered in lieu of the taking of evidence in this cause; and the cause was submitted for decision upon the application for an interlocutory injunction and upon the prayer of the Bill for a permanent injunction herein, and said cause being fully argued by counsel for the respective parties, the Court takes time to consider of its decision.

And a brief having been filed for the plaintiff and a brief for the defendant, upon request of counsel for plaintiff, [fol. 688] leave is hereby extended to the plaintiff to file a reply brief within five days and upon request of counsel for the defendant, leave is granted to file an additional brief within five days after delivery of a copy of plaintiff's reply brief to counsel for the defendant.

[fol. 689] IN UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA

In Equity. No. 3492

[Title omitted]

STIPULATION OF FACTS ENTERED INTO BETWEEN THE PLAINTIFF AND THE DEFENDANT HEREIN, IN LIEU OF THE FORMAL TAKING OF EVIDENCE—Filed September 11, 1936

[fol. 690] It is stipulated and agreed by the plaintiff and the defendant in the above entitled cause that, for all purposes of this cause, this Stipulation of Facts, the statements and figures herein, and the exhibits and appendices hereto attached or herein referred to, shall be treated as and shall be evidence upon which facts may be found, conclusions based, and the decision of the Court made, with the same effect as if said statements and figures had been testified to by competent witnesses and the said exhibits and appendices received in evidence at the trial of this cause, that is to say:

(1)

The amount involved in this cause is the sum of $135,761.51, exclusive of interest and costs, being the amount claimed to be due by the defendant to the State of West Virginia from the plaintiff as taxes and penalties under the

provisions of the Gross Sales and Income Tax Law of West Virginia, Article 3, Chapter 11, Code of West Virginia, 1931 and as amended, effective May 27, 1933, for the years 1933 and 1934.

(2)

The plainfiff is a Pennsylvania corporation, created under the laws of said State, with its principal office and factories in Pittsburgh, Pennsylvania.

[fol. 691] (3)

The defendant is the State Tax Commissioner of West Virginia. His principal office is at the State Capitol, Charleston, West Virginia, in the Southern District thereof, and he is a citizen and resident of said State and District. He is charged with the duty of assessing and collecting taxes of the character here involved due to the State, and is empowered to enforce the collection thereof.

The defendant has made an assessment against the plaintiff for the calendar years 1933 and 1934 upon the gross receipts of money received by the plaintiff during said two years from the United States of America under four contracts hereinafter more particularly described.

The defendant has further notified plaintiff of said assessment, and has also notified plaintiff that unless said amount claimed as taxes and penalties, in the amount of $135,761.51, is paid immediately, that the defendant, Fred L. Fox, would be forced to proceed in accordance with the law to collect the same and to distrain on the property of plaintiff to collect the same.

A letter of the defendant addressed to the plaintiff under date of July 15, 1935, and the copies of gross sales tax returns and assessments made up by the defendant on the prescribed forms of the defendant as State Tax Commis-[fol. 692] sioner, attached thereto, showing the tax and penalty due the State of West Virginia from the plaintiff for the years 1933 and 1934, filed with the plaintiff's bill of complaint as "Plaintiff's Exhibit No. 2," are true and correct copies thereof.

The amount in figures claimed as taxes and penalties for which the defendant has made an assessment against the plaintiff and threatens to distrain upon the property of the

plaintiff for the collection of said taxes and penalties, is as follows:

From January 1, 1933, to May 26, 1933:		
Gross	$2,092.78	
Penalties	774.35	
		$2,867.11
From May 27, 1933, to December 31, 1933:		
Gross	$30,011.89	
Penalties	6,302.50	
		36,314.39
From January 1, 1934, to December 31, 1934:		
Gross	$88,605.51	
Penalties	7,974.50	
		96,580.01
		$135,761.51

This proceeding has been instituted by the plaintiff under the provisions of Section 266 of the Judicial Code (U. S. Code Annotated, Title 28, Section 380) for hearing by a statutory three judge court on application for an interlocutory injunction.

(4)

The two letters from the Secretary of War to the Speaker [fol. 693] of the House of Representatives of the Congress of the United States, filed with the plaintiff's bill of complaint, House of Representatives Document No. 190, Seventieth Congress, as Exhibit No. 7, and House of Representatives Document No. 31, Seventy-third Congress, as Exhibit No. 8, are true and correct copies thereof.

(5)

During the years 1932 and 1933 the plaintiff entered into four written contracts with the United States pertaining to the construction of locks and dams in the Kanawha and Ohio Rivers. These said locks and dams are constructed at or near points on said rivers known as Marmet, London and Winfield, West Virginia, on the Kanawha River, and near Gallipolis, Ohio, on the Ohio River, and within the exterior boundaries of the State of West Virginia.

True copies of each of said four contracts are filed with the plaintiff's bill of complaint as parts thereof, designated Exhibits Nos. 3, 4, 5 and 6. In addition, the contract for

the construction at Winfield (Plaintiff's Exhibit No. 5) was changed by direction of the United States, and accepted by the plaintiff, by a Change Order dated December 28, 1933, appended hereto as a part of this stipulation, marked "Appendix A." The said four contracts between the plaintiff and the United States are briefly described as follows:

[fol. 694] (a) Plaintiff's Exhibit No. 3. A written contract dated August 30, 1932, between the plaintiff and the United States of America. This contract deals with a roller gate dam and a permanent upper lock gate at the Marmet lock and dam in the Kanawha River, in Kanawha County, West Virginia, near the Town of Marmet, in said State, about nine miles above the City of Charleston and sixty-eight miles above the junction of the Kanawha River and the Ohio River.

(b) Plaintiff's Exhibit No. 4. A written contract dated November 26, 1932, between the plaintiff and the United States. This contract deals with a lock and roller gate dam, and appurtenant works, alterations to the upper miter gate of an existing lock, a power house on the river wall of an existing lock, and furnishing and installing power house machinery and lock illumination system at the London lock and dam in the Kanawha River, in Kanawha County, West Virginia, near the Town of London, in said State, about twenty-four miles above the City of Charleston and eighty-three miles above the junction of said Kanawha River and the Ohio River.

[fol. 695] (c) Plaintiff's Exhibit No. 5. A written contract dated October 24, 1933, between the plaintiff and the United States of America. This contract deals with twin locks, and appurtenant works, in the Kanawha River near the Town of Winfield, in Putnam County, West Virginia, about twenty-seven miles below the City of Charleston and thirty-one miles above the junction of said Kanawha River and the Ohio River.

This contract was subsequently modified by Change Order No. 1, filed herewith as "Appendix A."

(d) Plaintiff's Exhibit No. 6. A written contract dated December 21, 1933, between the plaintiff and the United States of America. This contract deals with two parallel locks, and appurtenant works, in the Ohio River, about nine miles below the City of Gallipolis, Ohio, and about three-

fourths of a mile below Lock and Dam No. 26, Ohio River, Hogsett, West Virginia. The site thereof is within the geographical boundaries of the State of West Virginia, in Mason County, in said State.

(6)

The said four contracts pertaining to said locks and dams were entered into by and between the plaintiff, The [fol. 696] Dravo Contracting Company, and the United States in the following manner:

Plaintiff received by mail in each instance an invitation by the United States to bid upon the proposed work. The invitation in each instance was mailed from Huntington, West Virginia, and received by the plaintiff at its office at Pittsburgh, Pennsylvania. The plaintiff, in each instance, prepared its written bid at its office at Pittsburgh, Pennsylvania, together with the required bid bond, also executed by plaintiff and surety at Pittsburgh, and conveyed same by special messenger to the United States Engineer Office of the War Department at Huntington, West Virginia. True and correct copies of each bid, including the invitation and instructions, are filed herewith marked "Appendix B." The United States Engineer Office at Huntington, West Virginia, notified plaintiff of the acceptance of plaintiff's bids in each instance by letter mailed at Huntington, West Virginia, and received by plaintiff in Pittsburgh, Pennsylvania.

In each instance written contracts and performance bonds were prepared by the United States and were forwarded by mail from Huntington, West Virginia, to the plaintiff at Pittsburgh, Pennsylvania. Plaintiff executed said contracts and bonds by the signatures of its duly authorized officers and the affixing of its corporate seal at Pittsburgh, Pennsylvania. The bonds were signed and sealed by the sureties at Pittsburgh, Pennsylvania. The contracts and bonds, after execution, were forwarded by [fol. 697] mail from the office of the plaintiff at Pittsburgh, Pennsylvania, to the United States Engineer Office at Huntington, West Virginia.

In each instance said contract was approved and executed by the United States Government in the following manner:

(a) The contract for the Marmet construction, Plaintiff's Exhibit No. 3, was signed by the United States District Engineer at Huntington, West Virginia. Thereafter, the contract was approved by the Chief of Engineers of the United States Army, at Washington, D. C., after which it was sent to Huntington, West Virginia, and there mailed from the United States Engineer Office to, and received by, the plaintiff at Pittsburgh, Pennsylvania.

(b) The contract for the London construction, Plaintiff's Exhibit No. 4, was signed by the United States District Engineer at Huntington, West Virginia. Thereafter, the contract was approved by the Chief of Engineers of the United States Army, at Washington, D. C., after which it was sent to Huntington, West Virginia, and there mailed from the United States Engineer Office to, and received by, the plaintiff at Pittsburgh, Pennsylvania.

[fol. 698] (c) The contract for the Winfield construction, Plaintiff's Exhibit No. 5, was signed by the United States District Engineer at Huntington, West Virginia. Thereafter, the contract was approved by the Division Engineer, Upper Mississippi Valley Division, at St. Louis, Missouri, after which it was sent to Huntington, West Virginia, and there mailed from the United States Engineer Office to, and received by, the plaintiff at Pittsburgh, Pennsylvania.

(d) The contract for the Gallipolis construction, Plaintiff's Exhibit No. 6, was signed by the United States District Engineer at Huntington, West Virginia. Thereafter, the contract was approved by the Division Engineer, Ohio River Division, of the United States Army, at Cincinnati, Ohio, after which it was sent to Huntington, West Virginia, and there mailed from the United States Engineer Office to, and received by, the plaintiff at Pittsburgh, Pennsylvania.

In each instance the performance bonds, and the sureties thereon, were approved by the Judge Advocate General of the War Department of the United States Government, at Washington, D. C.

[fol. 699] (7)

Plaintiff's Gross Income for 1933 and 1934

The gross income of the plaintiff for the years 1933 and 1934 for its performance of said four contracts with the United States was as follows:

From January 1, 1933, to May 26, 1933	$701,591.99
From May 27, 1933, to December 31, 1933	1,501,344.67
From January 1, 1934, to December 31, 1934	4,431,525.63
	$6,634,462.29

Defendant demanded that plaintiff include in its return for 1933 and 1934 its gross income from said government contracts hereinabove described, but plaintiff refused to do so. Upon demand by defendant, plaintiff, by letter, expressly reserving its right to contest the legality of any tax thereon and plaintiff's liability therefor, submitted to defendant its gross income from these said contracts for the years 1933 and 1934 in the figures last above stated.

The gross income received by plaintiff from the United States under the said contracts was the agreed compensation paid to plaintiff by the United States by the terms of said contracts for all and everything done by the plaintiff in the performance of said contracts.

[fol. 700] Method of Payment by United States

Payments of the amount received by plaintiff under the several contracts were made monthly, or semi-monthly, by checks drawn by a disbursing officer of the War Department of the United States, at Huntington, West Virginia, on the United States Treasury, in favor of the plaintiff, and were delivered by mail from Huntington, West Virginia, to the office of the plaintiff at Pittsburgh, Pennsylvania. The monthly, or semi-monthly, payments were based upon estimates of amounts made by the representatives of the United States for materials delivered to, and the materials fabricated during the particular month by, the plaintiff at its Neville Island Shops at Pittsburgh, Pennsylvania, for use in said locks and dams, as provided by the respective contracts; and also for materials delivered, including fabricated materials for use in said locks and dams, to, and for work performed during the particular month at, each site

where the locks and dams were being erected, as provided by the respective contracts. A retained percentage of ten per cent. (10%) on each estimate was paid upon the final acceptance of the completed work under each contract. Typical monthly estimate sheets, marked "Appendix C", and also total estimate sheets for the years 1933 and 1934, marked "Appendix C-1," used under each of the four contracts mentioned, are filed herewith.

[fol. 701] (8)

Performance of the Contracts

During 1933 and 1934 plaintiff completed the performance of its contracts pertaining to the locks and dams at Marmet and London. Plaintiff completed performance of its contract at Winfield in February, 1935. Plaintiff has partially performed its contract at Gallipolis and is now engaged in the further performance of said contract. For the work so performed during 1933 and 1934 plaintiff received the gross sums hereinabove stated in Paragraph (7).

(9)

Nature of the Tax Involved

The tax assessed and sought to be collected by the defendant, the State Tax Commissioner, is based on the provisions of the Gross Sales and Income Tax Law of the State of West Virginia, as contained within the provisions of Article 13, Chapter 11 of the Code of West Virginia, and as amended by Chapter 33, Acts of the Legislature of West Virginia, at its First Extraordinary Session in 1933, effective May 27, 1933. A true copy of the said law as amended is filed with the plaintiff's bill of complaint, marked Exhibit No. 1. So far as this suit is concerned, the only difference between the law in effect prior to May 27, 1933, and thereafter is that the rate of tax sought to be imposed [fol. 702] prior to May 27, 1933, is three-tenths of one per cent of the gross income of the business, and on and after May 27, 1933, the rate of tax is two per cent of the gross income of the business.

The above tax is in addition to other taxes imposed on the plaintiff by the said State of West Virginia, and paid by the plaintiff for the years 1933 and 1934, namely (1) the tax on foreign corporations for doing business in the said

State, as provided by Article 12 of Chapter 11 of the Code of West Virginia, particularly Sections 69 and 71 thereof, commonly known as the license tax on foreign corporations; and (2) the ad valorem taxes upon the property, real and personal, of the plaintiff company in West Virginia. The plaintiff also paid each year the annual fees of the State Auditor for his services as attorney in fact for a foreign corporation, as provided by Section 73, Article 12, Chapter 11 of the Code of West Virginia.

The said gross sales and income tax statutes under which defendant seeks to collect taxes from the plaintiff are revenue statutes only and not regulatory measures. The revenues realized thereby become part of the general funds of the State, and are for the general purposes of state government.

[fol. 703] (10)

The Plaintiff

The original company, F. R. Dravo & Company, was a partnership formed in 1891. The Dravo Contracting Company was incorporated under the laws of New Jersey in 1901, and was the successor of F. R. Dravo & Company. Dravo Engineering Works was incorporated under the laws of Pennsylvania in 1918. The plaintiff, the present The Dravo Contracting Company, was incorporated under the laws of Pennsylvania in 1921, and is the successor of the Dravo Contracting Company, the New Jersey Corporation, and Dravo Engineering Works (a Pennsylvania corporation). Plaintiff, and its predecessor companies, have been engaged in the general contracting business since 1891. Plaintiff carries on, and has carried on, its business generally throughout the United States. It maintains its office at Neville Island, Pittsburgh, Pennsylvania. The plaintiff operates a plant and shops, including machine, structural and pattern shops, and other facilities for shaping and fabricating structural steel, machinery and equipment of various kinds, and also warehouses for storage, at Neville Island, Pittsburgh, Pennsylvania. The plaintiff neither owns nor maintains any manufacturing, structural or pattern shops for fabricating structural steel, manufacturing or fabricating machinery and equipment at any other place. The President and the executive officers, including the board of directors, of the plaintiff company reside in Pittsburgh or its

suburbs, in the State of Pennsylvania, and their offices in [fol. 704] connection with their duties with the plaintiff are at Neville Island, Pittsburgh, Pennsylvania. The business policies of the plaintiff are formulated at said office at Neville Island, Pittsburgh, Pennsylvania.

The Dravo Contracting Company first qualified and was admitted to do business as a foreign corporation in the State of West Virginia in the year 1922, and from then until now has been authorized to do, and has been engaged from time to time in doing, business in West Virginia as a foreign corporation, and since that time until now, during the periods it was performing any work in West Virginia, has been a subscriber to the Workmen's Compensation Fund of the State of West Virginia, as provided by its laws.

Plaintiff maintained on land owned by the United States at each site of work where the locks and dams were erected in West Virginia a temporary wooden one-story structure for housing maps, plans and records of the work at each particular site, and also kept there records of the time that the employees of the Company worked, to which building men came in person to apply for employment, and it was called by those who worked at the respective sites "the office" and was what is usually designated as a temporary construction office. Also, there were temporary one-story structures for storage of tools, implements and materials at the respective sites of work. These temporary structures were used by the employees of the plaintiff company and in general for the following purposes, namely, the field engineers, for field engineering work and to keep their records and make their reports; the field superintendents, for their [fol. 705] field office work; the timekeepers, to make up and keep their records; the paymaster, to make up his payrolls; the carpenters, for the keeping of tools; foremen; and first aid station for injured persons; and blacksmith shop. The plaintiff received applications for employment at the site of each construction and employed workmen there, in addition to the employees who were employed outside the State of West Virginia and sent into West Virginia for work at the site of each construction.. These temporary structures were demolished or abandoned upon completion of each job. The plaintiff maintained no other office nor place of business in West Virginia. The superintendent who was sent into West Virginia by the plaintiff company in connec-

tion with the work at Gallipolis, for the better part of the year 1934, had a room, used as an office, on land not owned by the United States, at Point Pleasant, in the County of Mason, West Virginia, for his superintendency and for correspondence, and also kept there a telephone for receipt of orders from the plaintiff at Pittsburgh and to relay such orders to the different sites of work, such office being located a few miles from the construction site at Gallipolis and in the town where the superintendent was then temporarily residing with his family.

Many supplies, such as electrical equipment, fittings, picks [fol. 706] and shovels and some miscellaneous materials, were purchased in West Virginia on requisition of the local superintendent and the invoices of the vendor were sent direct to Pittsburgh to the home office of the plaintiff company, which issued checks for payment, the amount of which supplies and miscellaneous materials averaged about Twenty-five Thousand Dollars ($25,000.00) a year for each contract.

Funds for pay roll purposes were forwarded from plaintiff's depositaries outside of the State of West Virginia to local banks in West Virginia, monthly or semi-monthly, as required, and workmen were paid by checks drawn on such local banks. Pay rolls were kept at the respective sites of construction and sent to the plaintiff at its office at Pittsburgh for their approval and upon their approval and order from the plaintiff at its office at Pittsburgh, checks were drawn by a designated employee, such as a paymaster or timekeeper at the respective sites of construction, and signed by the local superintendent in charge of the work and the timekeeper or paymaster, and delivered to the respective workmen. The pay roll system at Marmet, London and Winfield was on a bi-monthly basis, there being a delay of about eight days as an average in payment, and at Gallipolis the payments were made weekly, there being a delay of about one week in payment, such delays being caused by the fact that all pay rolls for labor at the respective sites of work were first sent to Pittsburgh for approval and then returned to the respective sites of work for payment. Occa- [fol. 707] sional payments for some labor in connection with some odd jobs were made by the local superintendent at the respective sites of construction and were paid by the local superintendent by checks drawn on local banks near each

site of construction where small checking accounts were kept for such purposes. Such petty payments did not exceed One Hundred Dollars ($100.00) for the whole period at each site for the locks and dams. Emergency or petty purchases of materials were made by the local superintendent at the respective sites of construction, for which invoices were sent to the main office of the plaintiff at Pittsburgh and were paid by checks issued by the office at Pittsburgh. No general banking accounts were maintained by the plaintiff in West Virginia.

(11)

Analysis of Plaintiff's Performance of Contracts

The plaintiff, prior to entering into said contracts with the United States, procured, by agreement, from Friederick Krupp Grusonwerk, Magdeburg, Germany, the right to obtain from said Friederick Krupp Grusonwerk and to use designs for the roller gates used in the construction of said locks and dams, as well as detailed plans for the fabrication, erection and installation thereof. A contract between the plaintiff and Krupp provided that: "Both parties [fol. 708] pledge themselves to cooperate exclusively with one another in business of this kind in the U. S. A. during the time this agreement remains in force." The term of the contract is for ten years from June 28, 1932, with the right in Krupp to terminate the exclusiveness of same in two years upon six months' notice if the royalty is not as large as contemplated. The agreement at this date is still in force. The roller gates described in said bids and made, fabricated and erected under said contracts were from said designs. The roller gates and machinery for the operation thereof, as defined in the respective contracts, were the only parts covered by the designs prepared and furnished by Krupp, although the designs so prepared and furnished by Krupp required minor modifications and alterations in the piers to accommodate the details of Krupp's detailed designs.

The plaintiff advised the United States prior to entering into the said contracts that the roller gate dams would be built upon designs drawn and furnished by Friederick Krupp Grusonwerk. The United States further knew at the time that the said contracts were entered into, by in-

formation furnished with the bids for the respective contracts, that the roller gates, lock gates, parts and other equipment and works incident thereto used in the operation of the respective locks and dams, were to be fabricated and manufactured at the plant and shops of the plaintiff [fol. 709] at Neville Island, Pittsburgh, Pennsylvania, where the same were fabricated and manufactured.

The word "fabricate" includes all shop operations on the metal being fabricated, including shearing, punching, drilling, bending, planning, machining, and all other operations preparatory to the assembling of the material into units. Subsequent to fabrication, the fabricated material was assembled into units of such a weight as could be efficiently handled and transported. The units so assembled were pre-assembled and fitted at the plaintiff's plant at Neville Island, Pittsburgh, Pennsylvania, prior to shipment, then they were disassembled into units for shipment by barge to the respective sites of the work, and there fully assembled.

The United States, at the time of entering into the contracts with The Dravo Contracting Company (plaintiff herein) had been advised by the written bids of the plaintiff of the names of the manufacturers of the various pieces of machinery and equipment that would go into the erection and construction of said locks and dams and the machinery and equipment of such manufacturers went into said construction except in such instances as the United States consented to the installation of machinery and equipment of other manufacturers. Copies of the said written bids for each of the four respective contracts made by the plaintiff [fol. 710] to the United States are herewith filed and made a part hereof, designated "Appendix B."

Plaintiff purchased outside of the State of West Virginia all materials used in the fabrication and manufacture of the roller gates, lock gates, cranes, substructure racks and spur rims, structural steel, patterns, hoisting mechanism and equipment under each of said contracts; and at its plant at Neville Island, Pittsburgh, Pennsylvania, fabricated and manufactured the same. The roller gates and the equipment appurtenant thereto were pre-assembled by the plaintiff at its Neville Island shops at Pittsburgh, Pennsylvania, and were there inspected and tested by the officers of the United States Government connected with the United

States Engineer Office at Pittsburgh, Pennsylvania. Thereafter, the same were partly disassembled into sections of such weight as could be handled and transported by barge. The hoisting mechanism and equipment were completely assembled at plaintiff's Neville Island plant. The lock gates and other equipment manufactured and fabricated by the plaintiff at its Neville Island shops were assembled into units of such weight as could be conveniently handled and shipped by the plaintiff at its said plant. The materials and equipment so fabricated and manufactured by the plaintiff were stored at its said plant until time for delivery; thereafter the same were transported by plaintiff by barge or other river craft upon and by means of the Ohio and Kanawha Rivers and delivered at the respective sites of [fol. 711] the work. The said sections of roller gates were unloaded from said barges in the river onto and into the cofferdams at the respective sites of work, and then onto the foundations or emplacements in the respective dams prepared for them, as the progress of erection required and were thereupon assembled and fitted into place; and also the hoisting apparatus and equipment used in the operation thereof were unloaded from said barges in the river directly onto the foundations or emplacements prepared for them on the piers of the dam. All the items included under the term, "Roller Gates," as used in the Marmet and London contracts, were fabricated, installed and erected in accordance with the detailed designs and specifications made by Friederick Krupp Grusonwerk. The lock gates were unloaded from said barges onto the lock walls or into the positions prepared for them, and there fully assembled.

In constructing the locks and dams, extensive earth and rock excavations on the banks of the river and entirely across the bed thereof to such depth as gave solid rock foundation for the concrete and masonry work were made. At Marmet, there were approximately 46,236.3 cubic yards of earth excavation and 9,383.5 cubic yards of rock excavation; at London, there were approximately 181,280 cubic yards of earth excavation and 9,171.9 cubic yards of rock excavation; at Winfield, there were approximately 191,335.6 cubic yards of earth excavation and 50,580.87 cubic yards of rock excavation; and at Gallipolis, there were approxi- [fol. 712] mately 555,000 cubic yards of earth excavation and 48,721.78 cubic yards of rock excavation.

The excavation in the bed of the river was done after the sinking of suitable cofferdams to hold out the water.

When necessary excavation had been done, the rock foundation was tested, drilled, and grouted and the concrete work was performed. There were mixed and poured at the various sites the following approximate cubic yards of concrete:

Marmet	28,729	cubic yards.
London	75,066.4	cubic yards.
Winfield	131,715.47	cubic yards.
Gallipolis	253,403.29	cubic yards.

Concrete was the material from which the piers and sills were made. The piers at Marmet were sunk to a depth of approximately 17 feet below lower pool water level and were built to a height of approximately 69 feet above said level. The piers at London were sunk to a depth of approximately 25 feet below lower pool water level and were built to a height of approximately 69 feet above said level. Between the piers, the roller gates were installed, thus making the dam. The locks were constructed near one bank of the river and the lock gates were placed between the lock walls.

[fol. 713] Between the piers of the dam a submerged dam or concrete sill was constructed, in the top of which was imbedded a steel sill beam. The edge of the roller gate apron contacts this sill and the gates and aprons act as movable superstructures to the dam.

The concrete in the roller gate piers was reenforced with steel. The concrete in the sills and in the lock walls was not, in general, reenforced with steel. Portions of the lock walls were protected with armor made of steel castings or structural steel. This armor was bolted in the forms before the concrete was poured. The metal sill beams were set and grouted in the concrete. Likewise the rack grillages which supported the removable racks upon which the roller gates moved were set in and surrounded with concrete. The supports of the armatures were imbedded in the concrete face of the piers.

The roller gates were supported by and movable upon the racks referred to above.

The lock gates were supported on a pintle bearing at the bottom and attached to the wall at the top by a hinged con-

nection. The sill beams for the miter gates were anchored to or imbedded in the top of the miter sill concrete foundations.

The service bridges were made of structural steel, truss [fol. 714] design, and were fabricated at the plaintiff's Neville Island plant. They were there assembled and riveted into as large units as could be handled and shipped by river barge. At the sites of construction these units were installed and the riveting completed. They were attached to the pier supports by means of anchor bolts.

All metal work subject to exposure to the elements received one coat of paint at the shop and two coats in the field after erection.

After the roller gates were preassembled and disassembled at the shop in such sections for shipment as described on page 22 hereof, they were shipped in eleven large sections and the aprons in three sections.

The aggregate weight was apparently 225 tons per roller gate. The end sections were fabricated in cylindrical units weighing approximately 30 tons each and the intermediate sections were shipped in segments of cylinders. The sections as shipped included braces as integral parts thereof. The rack castings were attached to the end sections before shipment. The various sections were unloaded as above stated at the respective work sites and were assembled and installed in place.

The lifting machinery was completely fabricated and assembled at Neville Island and shipped as a unit by barge to [fol. 715] the respective work sites. It was unloaded and set in place on the tops of the piers.

The assembled roller gates were caulked and tested for leakage as required at the work sites.

In the average roller gate at the fabricating shop at Neville Island, there were placed approximately 25,412 rivets and at the work site approximately 10,942. In the average flap gate at the fabricating shop at Neville Island, there were placed approximately 37,750 rivets and at the work site approximately 5,150. At Marmet and London there were at times as many as six rivet gangs, consisting, in the aggregate, of six riveters and eighteen other men employed, all of which gangs worked at the same time and in one shift. The work on a roller gate at a stage nearing completion of its assembly at the work site is shown by photographs thereof in appendices marked "Appendix D"

and "Appendix D-1" filed herewith. The roller gates consist of several parts: The drums and aprons, embedded substructures, including racks, guard rails, spur rims, sill beams and liner plates, hoisting mechanism, motors and electrical control and lifting chains, and other parts and equipment, as defined in the respective contracts.

Roller gate dams are a comparatively new type of construction in this country. They are dams that control the [fol. 716] water level of the river in which they are located by the raising and lowering of cylindrical gates, mechanically operated by electricity. Prior to the erection of the Marmet dam (covered by the contract—Plaintiff's Exhibit No. 3), very few dams of this type had been erected in this country. Only one dam for river and flood control and navigation had been undertaken by the United States prior to the making of the contract for the Marmet dam; this being a dam, known as the Rock Island Dam, on the Mississippi River between Iowa and Illinois, which was being constructed at the same time that the said Marmet dam was being built, and the roller gates of the Marmet dam were in operation before those in the said dam on the Mississippi River. This dam was let to contract to S. A. Healy of Chicago, Illinois, who sublet the roller gates thereof to F. Morgan Smith Company, of York, Pennsylvania, which furnished the designs based on designs of a company known as M. A. N. (this being the well-known trade name of Maschinenfabrik-Augusburg-Nurnberg-Aktien-Gesellschaft, a prominent designing and construction company of Germany), upon which designs the American Bridge Company of Gary, Indiana, fabricated the roller gates and installed them under the supervision and direction of F. Morgan Smith Company.

In 1913 the Bureau of Reclamation of the Interior Department of the United States Government constructed a [fol. 717] roller gate dam at Grand Junction, Colorado, under designs made and furnished by M. A. N.; the roller gates and other apparatus were fabricated by the Rider-Connelly Company (later known as McClintic-Marshall) of Pittsburgh, Pennsylvania. In 1924 a roller gate type dam was constructed at Wallonpaupack, Pennsylvania, for the Penn Power and Light Company, of which the fabrication of the roller gates was done by F. Morgan Smith Company, of York, Pennsylvania, under designs and drawings pre-

pared by said company under supervision of said M. A. N. In 1926 a roller gate type dam was erected at Lewiston, Montana, for the Inland Power and Light Company; two of the gates were fabricated and built by F. Morgan Smith Company, and a third gate by Williamette Iron and Steel Company, of Portland, Oregon. In 1927 a roller gate type dam was constructed at Bellows Falls, Vermont, the fabrication and the supervision of the installation of which was done by F. Morgan Smith Company, based on M. A. N. designs. The City of Fort Wayne, Indiana, constructed a small dam of similar type for reservoir and park purposes. It is not known to the parties who did the fabrication and installation of the roller gates in this relatively small dam.

The assembling, fabrication, erection and installation of roller gate dams, and the equipment appurtenant thereto, of which these dams erected and installed by the plaintiff [fol. 718] were a type, required skill and precision. Likewise, the assembling, fabrication, erection and installation of lock gates and the equipment appurtenant thereto, of which the locks erected and installed by the plaintiff were a type, required an organization with experience in structural steel construction. The United States required the plaintiff to employ an organization thoroughly experienced and skilled in such work. Previous to the four contracts here under consideration, during the years 1931 and 1932, under a contract with the United States for locks and lock gates only (which contract is not involved in this proceeding), the plaintiff company constructed Lock B at Marmet, West Virginia, by the fabrication, assembly, erection and installation of lock gates and the equipment appurtenant thereto, for which contract the plaintiff was not the low bidder, which was A. G. Rothen of Elizabeth, Pennsylvania, to whom the contract was refused by the United States. Likewise, the plaintiff was not the low bidder on the contract for the locks and lock gates at Winfield (which is one of the four contracts involved in this proceeding), but the low bidder at Winfield was the Braden Construction Company of New York, New York, to whom the United States refused to award the contract. In both instances, on the contract for Lock B at Marmet (not involved herein as aforesaid) and on the contract for the locks and lock gates at Winfield (Plaintiff's Exhibit No. 5 with Bill of Complaint), the Dravo Company, plaintiff herein, was the

next lowest bidder, and the respective contracts were awarded to it. With respect to the other three contracts involved in this proceeding, the plaintiff company was the low bidder.

[fol. 719] Representatives of the United States Government from the United States Engineer Corps, if called by the plaintiff as witnesses, would testify:

That in the opinion of the representatives of the United States the contract aforesaid, on which A. G. Rothen was the low bidder, was refused by the United States because the said A. G. Rothen was disqualified due to an unbalanced bid, failure to comply with specifications and lack of experience and plant, and that the contract aforesaid on which the Braden Construction Company was the low bidder was refused by the United States because the said Braden Construction Company was disqualified due to lack of sufficient experience on similar work and lack of plant.

The plaintiff purchased outside of West Virginia other materials, including cement, reenforcing steel, riprap, forms for cofferdams, timber, steel piling, bolts and washers, paint, corrugated sheets, and miscellaneous materials and supplies, and transported the same by rail or river from the place of purchase to the site of the particular work, and unloaded same from barges at the place of construction and placed and installed the same into the locks and dams. Some of said materials, such as lumber and reenforcing steel, were stored on property of the United States Government adjoining the respective sites of the work. The plaintiff purchased from persons in West Virginia certain materials such as lumber, bolts, cable, sand, gravel, reenforcing steel, riprap, forms for cofferdams, and miscellaneous materials and supplies, which were delivered by the [fol. 720] seller to the plaintiff at the sites of the particular work and placed and installed into the locks o· dams, and some were stored on property of the United States Government adjoining the respective sites of the work.

Plaintiff owned or leased and used various river craft specially adapted for lock and dam construction work, such as barges, dredges, derrick boats, whirlers, and other craft fitted out with machinery and equipment. Plaintiff employed towboats owned or leased and operated by plaintiff. All the river craft, both owned and leased, was taken from Pennsylvania into West Virginia and as the use of the river

craft upon the various jobs in West Virginia was ended, that not required on the jobs still in the process of construction was taken out of the State of West Virginia and returned to Pennsylvania.

Plaintiff transported some of their engineers, mechanics and workmen into the State of West Virginia, who were experienced and skilled in performing the particular work required to be done under said contracts; and also employed local skilled and unskilled labor at each site of work.

Patterns made by the plaintiff at Pittsburgh, Pennsylvania, for the roller gates and lock gates, as provided by three of the contracts, were delivered by the plaintiff to the United States at the United States Repair Station, at [fol. 721] Marietta, Ohio, before final payments therefor.

Partial Payments by United States to Plaintiff

From time to time partial payments were made by the United States to plaintiff for certain materials purchased by and delivered to the plaintiff at its Neville Island shops, also for certain articles and equipment manufactured or fabricated by the plaintiff during the progress of the work; and other partial payments were made upon delivery of such manufactured or fabricated articles and equipment at the respective sites of construction, and upon installation thereof, as provided by the respective contracts, in amounts as follows:

Under the Marmet Contract
(Plaintiff's Exhibit 3)

Article	Amount paid upon fabrication at Neville Island Shops	Amount paid on delivery at site	Amount paid on installation
Roller Gates	$67,141.60	$21,894.00	$71,520.40
Embedded sills, beams and bolts	14,596.00	7,298.00	20,434.40
Hoist, Motor and Control	46,707.20	10,217.20	8,757.60
Lifting Chain	17,515.20	4,378.80	1,459.60
Total	$145,960.00	$43,788.00	$102,172.00

[fol. 722]

Under the London Contract
(Plaintiff's Exhibit 4)

Roller Gates	$75,900.00	$24,750.00	$80,850.00
Embedded racks, rails, sill beams and bolts	16,500.00	8,250.00	23,100.00
Hoist, Motor and Control	52,800.00	11,550.00	9,900.00
Lifting Chain	19,800.00	4,950.00	1,650.00
Total	$164,000.00	$49,500.00	$115,500.00

Under the Winfield Contract
(Plaintiff's Exhibit 5)

Article	Amount paid on delivery of materials at Neville Island Shops	Amount paid upon fabrication at Neville Island Shops	Amount paid on installation
Lock gate operating machines	$10,080.00	$10,080.00	$13,440.00
Stoney gate valves	31,920.00	31,920.00	42,560.00
Lock Gates	31,200.00	31,200.00	41,600.00
Total	$73,200.00	$73,200.00	$97,600.00

[fol. 723] Under the Gallipolis Contract
(Plaintiff's Exhibit 6)

Structural Steel and wrought iron	$77,710.80	$77,710.80	$99,773.43
Nickel Steel	2,544.99	2,390.73	3,187.64
Steel Forgings	4,158.21	4,128.21	5,544.28
Steel reenforcings	14,858.12	14,858.12	19,810.83
Castings	16,707.02	15,883.28	21,177.71
Bolts	2,205.97	2,205.97	2,941.30
Bronze	1,314.11	1,314.11	1,752.14
Babbitt	1,440.00	1,440.00	1,871.52
Piping System	7,800.00	7,800.00	10,400.00
Hand Railing	390.00	390.00	.....
Tainter Valves	15,363.00	15,363.00	20,484.00
Lock Gate Machinery	12,000.00	12,000.00	.....
Total	$156,492.00	$155,514.22	$186,942.85

[fol. 724] Payments for Other Materials Made by United States to Plaintiff

The four contracts provided for partial payments to the plaintiff for certain other materials named in the specifications, and such payments were made during the years 1933 and 1934 with respect to the several contracts, as more fully shown by the total estimate sheets filed herewith as "Appendix C-1," as follows (no payments made after December 31, 1934, are shown):

Under the Marmet Contract
(Plaintiff's Exhibit 3)

Article	Unit price	Amount paid on delivery at work site	Amount paid on placement at work site
Structural Steel	$0.047	$41,226.20	$27,484.13
Nickel Steel	.08	18,545.73	12,363.82
Cold-rolled Steel	.12	258.52	172.35
Reenforcing Steel	.04	10,050.27	6,700.18
Steel Forgings	.08	673.09	448.73
Bolts	.09	941.44	627.63
Iron Castings	.10	40.46	26.98
Steel Castings (Class B)	.095	3,099.32	2,066.22
Steel Castings—Nickel Steel	.10	683.76	455.84
Bronze	.50	134.10	89.40
Steel Sheet Piling	.70	6,397.78	9,596.66
Structural Steel	.04	1,911.77	1,274.51
Reenforcing Steel	.04	161.42	107.61
Bolts	.08	55.44	36.96
Total		$84,179.30	$61,451.02

[fol. 725] Under the London Contract

(Plaintiff's Exhibit 4)

Article	Unit price	Amount paid on delivery at work site	Amount paid on placement at work site
Sheet Steel Piling	$1.00	$5,600.16	$8,400.24
Structural Steel	.947	51,646.04	34,259.86
Nickel Steel	.07	487.20	324.80
Cold-rolled Steel	.12	147.60	98.40
Reenforcing Steel	.04	12,314.27	8,201.64
Steel Forgings	.12	2,430.30	1,620.20
Steel Castings (Class A)	.06	10,271.66	6,847.77
Steel Castings (Class B)	.10	6,574.39	4,332.49
Steel Castings—Nickel Steel	.12	75.02	.50.02
Iron Castings	.15	637.36	424.91
Bolts	.09	1,127.10	734.29
Bronze	.50	583.20	388.60
Babbitt Metal	.30	787.14	524.76
Cast Iron Pipe	.08	225.70	150.46
Steel Pipe—6"	2.50	87.00	58.00
Piping System	9,000.00	5,400.00	3,545.00
2 Stoney Gate Valves	12,000.00	14,400.00	9,600.00
4 Lock Gate Operating Machines	3,500.00	8,400.00	5,600.00
Steel Sheet Piling	.70	6,840.23	10,260.35
Reenforcing Steel	.04	225.05	150.03
Cast Iron Pipe	.03	715.05	476.70
Total		$128,974.47	$96,048.52

[fol. 726] Under the Winfield Contract

(Plaintiff's Exhibit 5)

Steel Sheet Piling	$1.20	$7,072.08	$10,608.12
Structural Steel and Wrought Iron	.053	28,801.26	18,159.07
Steel Forgings and Cold-rolled Steel	.08	1,194.24	796.16
Reenforcing Steel	.05	11,215.98	7,474.00
Castings—Iron, Steel and Cast Iron Pipe	.08	8,976.91	5,616.00
Bolts	.12	1,002.60	668.40
Bronze	.30	120.24	80.16
Pipe—Vitrified Clay—12"	1.20	594.00	396.00
Conduit—Fibre—3" and 4"	.30	2,566.80	1,500.00
Conduit—Metal—1½" and 3"	1.30	145.08	96.72
Piping System	22,000.00	13,200.00	.....
Hand Railing	1,100.00	660.00	440.00
Electric Wiring, Illumination and Control Equipment:			
(a) Lighting	6,500.00	3,900.00	.....
(b) Incoming Power Feeders	1,500.00	900.00	.....
(c) Tow Haulage Unit Feeders	1,100.00	660.00	.....
(d) Remote Control Stations	2,500.00	1,500.00	.....
2 Floating Mooring Bitts	3,500.00	4,200.00	2,800.00
Total		$86,709.19	$48,634.63

[fol. 727] Under the Gallipolis Contract

(Plaintiff's Exhibit 6)

Steel Piling	$1.20	.....	.....
Pipe—Vitrified Clay—12"	1.50	$1,179.00	.....
Conduit—Fibre—3" and 4"	.25	2,910.00	$533.61
Conduit—Metal—1" and 1½"	2.00	192.00	87.41
Floating Mooring Bitts	3,500.00	.....	.....
Total		$4,281.00	$621.02

River Craft

Plaintiff owned or leased the following river craft used in connection with transporting equipment, machinery, and materials into the State of West Virginia from other States and in the construction work at the respective sites of work in West Virginia:

Marmet Contract:

4 derrick boats
3 Mixer boats
2 dump scows
5 cement barges
44 steel sand and gravel barges
2 Diesel towboats

[fol. 728] London Contract:

6 derrick boats
3 mixer boats
4 dump scows
5 cement barges
45 steel sand and gravel barges
4 towboats

Winfield Contract:

7 derrick boats
1 mixer boat
8 cement barges
4 dump scows
47 steel sand and gravel barges
6 towboats
1 sand digger

Gallipolis Contract:

7 derrick boats
2 mixer boats
4 dump scows
8 cement barges.
47 steel barges
6 towboats
1 sand digger

[fol. 729] Equipment

Plaintiff further transported into West Virginia the following equipment used in the construction work at the respective sites:

Equipment—Continued

Marmet Contract:

5 wood whirler cranes with engines, motors, and boilers
24 pumps with motors
2 air compressors with motors and receivers
2 bolt machines with one motor
1 power hacksaw
5 pile hammers
2 sets wood pile leads
2 pile extractors
1 saw table with motor
1 band saw with motor
2 broaching machines with tugger hoists
2 boilers in boiler plant
2 gasoline dinkey locomotives
2 flat cars
2 cement conveyors
2 channeling machines
2 drill sharpeners
12 clamshell buckets
1 orange peel bucket
11 concrete buckets
1 crawler crane
2 air motors
1 extra 2-drum hoisting engine
2 spare motors

London Contract:

2 steel whirlers with engines, motors, and boilers
7 wood whirlers with engines, motors, and boilers
2 crawler cranes
4 air compressors with motors, receivers, and after-coolers

[fol. 730]

2 concrete mixers with motors
3 cement conveyors
2 gasoline dinkey locomotives
4 flat cars
7 pile hammers
4 sets wood pile leads
2 pile extractors
1 steel frame for pile hammer

Equipment—London Contract—Continued

2 channeling machines
3 broaching machines with tugger hoists
1 pipe cutting machine
1 bolt machine with motor
1 alligator shear with motor
1 bar bender with engine
1 saw table with motor
1 band saw with motor
2 boilers
28 pumps with motors
2 air motors
25 clamshell buckets
3 shaft buckets
11 concrete buckets
1 extra swinging engine
1 extra 2-drum hoisting engine
2 spare motors
1 spare water tank

Winfield Contract:

3 steel whirlers with engines and motors
8 wood whirlers with engines and motors and boilers
2 crawler cranes
4 air compressors with receivers, motors and after-coolers
22 pumps with motors
2 air motors
3 concrete mixers with motors, batchers, etc.
3 cement conveyors
17 concrete buckets
3 gasoline dinkey locomotives
5 flat cars
1 lathe
1 pipe machine with motor
1 bar bender with engine and motor
6 pile hammers
1 set pile leads
2 pile extractors
1 saw table with motor
1 band saw with motor

[fol. 731] Equipment—Winfield Contract—Continued

6 broaching machines with tugger hoists
2 generators
21 clamshell buckets
3 shaft buckets
3 spare motors
2 spare boilers
1 spare water tank

Gallipolis Contract:

10 wood whirlers with engines, motors, and boilers
6 steel whirlers with engines, motors and boilers
3 crawler cranes
3 concrete mixers with motors
6 air compressors with motors
7 broaching machines with tugger hoists
5 bolt and pipe machines with motors
29 pumps with motors
2 saw tables with motors
2 band saws with motors
1 bar bender
3 spare boilers
28 clamshell buckets
22 concrete buckets
3 pile extractors
3 sets pile leads
1 drill sharpener
2 channeling machines
2 cement conveyors
4 dinkey locomotives (gasoline)
5 flat cars
3 transformers
1 air motor
1 spare electric motor
7 pile hammers

Various pictures, correctly showing various stages of fabrication, assembly, transportation, installation, erection, and completion of the work under the respective contracts, [fol. 732] are shown by photographs filed herewith, marked "Appendix D," submitted by plaintiff, and "Appendix D-1," submitted by defendant.

Cost of Materials Purchased by Plaintiff Outside West Virginia

Plaintiff purchased outside of the State of West Virginia, materials used in the fabrication, at its Neville Island Shops, of the roller gates, chains, hoists, lock gates, including protection armor for lock walls, and other machinery items, which were later transported into West Virginia, the cost of which materials, the labor and fabrication costs, and costs of transporting and returning materials, and repair parts, for the respective sites of work were as follows:

Marmet Dam

Cost of Materials	$207,202.52
Fabrication and labor costs	141,374.24
Costs of transporting material and furnishing repair parts	5,612.91
	$354,189.67

London Lock and Dam

Cost of materials	$256,713.97
Fabrication and labor costs	160,798.68
Costs of transporting materials and furnishing repair parts	8,211.11
	$425,723.76

[fol. 733]

Winfield Locks

Cost of materials	$125,201.79
Fabrication and labor costs	111,653.89
Costs of transporting materials and furnishing repair parts	23,810.07
Cost of sand and gravel	9,880.40
	$270,546.15

Gallipolis Locks

Cost of materials	$183,753.53
Fabrication and labor costs	178,245.32
Costs of transporting materials and furnishing repair parts	17,336.43
Cost of sand and gravel	11,246.82
	$390,582.10

The following tables show the expenditures of the plaintiff for materials and supplies purchased outside of the State of West Virginia, and transported into West Virginia, for use at the respective sites:

Marmet Dam

Cement	$55,352.73
Reenforcing Steel	1,382.94
Form rods and Clamps	1,138.66
Steel Piling	38,920.56
Lumber—all kinds	5,992.22
Tools	6,093.17
Miscellaneous	8,960.29
	$117,840.57

[fol. 734] London Lock and Dam

Cement and Lime	$142,794.29
Reenforcing Steel	8,231.41
Steel Piling	74,334.56
Lumber—all kinds	15,543.35
Tools	13,189.10
Pipe and Fittings—all kinds	12,925.14
Castings (permanent materials)	7,115.92
Electrical Supplies	5,579.62
Form Rods and Clamps	3,857.89
Rope—all kinds	4,780.58
Miscellaneous	30,621.74
	$318,973.60

Winfield Locks

Cement	$263,924.31
Reenforcing Steel	893.02
Form Rods and Clamps	2,204.67
Steel Piling	30,294.04
Lumber—all kinds	21,653.36
Tools	8,632.57
Pipe and fittings—all kinds	18,712.36
Electrical Supplies	6,210.44
Rope—all kinds	5,081.42
Sand and Gravel	9,996.14
Miscellaneous	24,207.11
	$391,809.44

Gallipolis Locks

Cement	$533,272.16
Reenforcing Steel	13,295.16
Expansion Joint Material	1,769.04
Form Rods and Clamps	6,336.36
Steel forms	31,796.98
Steel Piling	135,061.13
Lumber—all kinds	37,798.87
Tools	11,025.05
Pipe and Fittings—all kinds	20,838.61
Electrical Supplies	16,819.47
Rope—all kinds	12,376.94
Sand and Gravel	9,608.69
Miscellaneous	48,480.58
	$878,479.04

[fol. 735] Cost of Materials Purchased by Plaintiff Inside West Virginia

The following tables show the expenditures of the plaintiff for materials and supplies purchased in West Virginia, for use at the respective sites:

Marmet Dam

Cement	$903.10
Sand	15,697.07
Gravel	30,420.87
Reenforcing Steel	6,251.17
Riprap	2,620.30
Steel Piling	448.16
Lumber—all kinds	5,557.90
Tools	1,685.43
Air, Water and Steam Hose	1,819.57
Drill Parts and Drill Steel	691.49
Oil, Grease and Waste	1,770.40
Electrical Supplies	1,291.13
Rope, and Cable, Blocks and Clips	4,588.04
Bolts, Washers, Nails, Screws, Rivets	1,263.51
Coal	5,849.49
Electric Power	10,648.38
Canvas and Oil Clothes	1,554.87
Oxygen and Acetylene	1,217.49
Repairs to Equipment	6,948.20
Miscellaneous	8,894.40
	$110,120.97

[fol. 736] London Lock and Dam

Cement and Lime	$138.25
Sand	51,287.61
Gravel	96,443.39
Reenforcing Steel	733.72
Riprap	1,063.63
Steel Piling and Wales	1,182.61
Lumber—all kinds	6,871.61
Tools	2,854.40
Pipe and Fittings—all kinds	1,835.87
Castings	111.38
Electrical Supplies	3,663.72
Form Rods and Clamps	2,173.73
Rope and Cable, Blocks and Clips	4,972.20
Air, Water and Steam Hose	1,215.91
Drill Parts and Steel	903.51
Oil, Grease, Waste and Packing	3,690.71
Bolts, Washers, Nails, Screws, Rivets	3,039.80
Coal	9,621.32
Electric Power	26,569.39
Gasoline	1,070.32
Oxygen and Acetylene	3,233.69
Repairs to Equipment	7,880.80
Miscellaneous	11,647.58
	$242,205.15

[fol. 737] Winfield Locks

Cement		$1,046.25
Sand and Gravel *		
Purchased	$4,973.95	
Produced by Plaintiff	49,064.04	
		54,037.99
Reenforcing Steel		6,767,10
Form Rods and Clamps		2,238,20
Expansion Joint Material		1,272.85
Riprap		3,305.65
Lumber—all kinds		6,816,74
Tools		12,260.93

*Note.—This figure excludes $78,517.37 paid by the Dravo Company for rental of equipment from owners thereof in Pennsylvania and brought into West Virginia and used for production and transportation of sand and gravel in West Virginia.

Winfield Locks—Continued

Pipe and Fittings	4,238.69
Electrical Supplies	11,937.83
Rope and Cable, Blocks and Clips	3,627.72
Castings	6,887.05
Air, Water and Steam Hose	1,515.94
Oil, Grease, Waste and Packing	3,856.29
Bolts, Washers, Nails, Screws	3,793.67
Coal	6,510.88
Electric Power	23,594.55
Gasoline	4,624.98
Oxygen and Acetylene	2,469.09
Repairs to Equipment	8,369.09
Dynamite and Exploders	3,361.83
Miscellaneous	17,516.36
	$190,049.68

[fol. 738] Gallipolis Locks

Cement		$196.13
Sand and Gravel *		
Purchased	$111,453.30	
Produced by Plaintiff	84,752.78	
		196,206.08
Reenforcing Steel		17.14
Expansion Joint Material		2,642.50
Form Rods and Clamps		2,141.33
Steel Forms		307.79
Lumber—all kinds		17,676.32
Tools		11,693.52
Pipe and Fittings—all kinds		6,973.29
Rope and Cable, Blocks and Clips		7,301.40
Electrical Supplies		6,064.22
Castings		5,094.14
Air, Water and Steam Hose		2,719.18
Oil, Grease, Waste and Packing		6,393.98
Bolts, Washers, Nails, Screws, Rivets		3,871.51
Drill Parts and Drill Steel		1,119.83
Canvas		1,198.45

*Note.—This figure excludes $93,567.58 paid by the Dravo Company for rental of equipment from owners thereof in Pennsylvania and brought into West Virginia and used for production and transportation of sand and gravel in West Virginia.

Gallipolis Locks—Continued

Coal	11,214.66
Gasoline	6,573.46
Oxygen and Acetylene	3,983.62
Repairs to Equipment	11,955.07
Dynamite and Exploders	3,154.42
Miscellaneous	23,655.19
	$332,153.23

[fol. 739] Expenditures for labor and work in West Virginia:

Pay Rolls in West Virginia

Marmet—From 8/1/32 to 5/15/34 (complete)	$211,079.90
London—From 11/1/32 to 7/15/34 (complete)	367,726.60
Winfield—From 10/12/33 to 11/30/35 (complete)	438,230.85
Gallipolis—From 10/23/33 to 11/30/35 (not yet completed)	875,066.10

(Note.—All figures used in the immediate foregoing tables show expenditures of the plaintiff in West Virginia, for materials, supplies, and labor, in connection with said contracts at the Winfield and Gallipolis locks, without limitation to the years 1933 and 1934.)

[fol. 740] Summary of Expenditures of Plaintiff

A summary of the approximate (1) cost of materials to be fabricated, purchased outside of West Virginia, and fabrication thereof, including labor, at plaintiff's plant at Neville Island; (2) cost of other materials purchased outside of West Virginia; (3) cost of transportation of men, materials and equipment into West Virginia from other states; (4) cost of construction bond premium, fire insurance, and drafting room and miscellaneous office expense incurred entirely outside of West Virginia; (5) fee paid to Frederick Krupp Grusonwerk; (6) rental for use of plant, and of equipment transported into and used in West Virginia in performance of said contracts; (7) cost of materials purchased from persons in West Virginia for each of the above mentioned contracts; and (8) expenditures for labor inside of West Virginia, as shown by the records of the plaintiff company, together with the total contract price received or estimated in connection with each of the four several contracts, as follows:

[fol. 741]

	Marmet	London	Winfield	Gallipolis
(1) Cost of materials, and fabrication at Neville Island, Pennsylvania, including labor	$354,189.67	$425,723.76	$270,546.15	$390,582.10
(2) Cost of other materials purchased outside of West Virginia	117,840.57	318,973.60	391,809.44	878,479.04
(3) Transportation costs, of haulage in interstate commerce	15,234.56	49,205.07	28,463.49	25,119.62
(4) Cost of insurance, and other charges, etc., at Neville Island, Pa	28,088.30	52,298.34	63,829.15	200,467.31
(5) Fee paid to Krupp	18,821.77	23,538.65	None	None
(6) Rental for use of plant, and of equipment in performance of said contracts	96,332.07	152,367.45	191,745.58	245,128.11
(7) Cost of materials purchased inside of West Virginia	110,120.97	242,205.15	190,049.68	332,153.23
(8) Expenditures for labor inside of West Virginia	211,079.90	367,726.60	438,230.85	875,066.10
Totals	951,707.81	1,632,038.62	1,574,674.34	2,946,995.51
Contract Price, Received or Estimated	976,640.44	1,722,047.66	1,891,828.52	3,393,660.63*

* NOTE.—Actual receipts to November 30, 1935	$3,273,660.63
Estimated balance of contract	120,000.00
Total	$3,393,660.63

The Dravo Contracting Company

Addendum Showing Expenditures Additional to those on Page 53 of Stipulation of Facts and Showing Total Expenditures of Plaintiff on Respective Contracts

	Marmet	London	Winfield*	Gallipolis*
Total expenditures page 53 of stipulation	951,707.81	1,632,038.62	1,574,674.34	2,946,995.51
1. Additional cost of materials and fabrication at Neville Island, Pennsylvania, including labor	.....	835.01	.....	27.05
2. Additional cost of other materials purchased outside of West Virginia	.....	38.70	2,390.75	.....
3. Additional transportation costs of haulage in interstate commerce	1,506.44	.....	.....	.....
4. Additional cost of insurance and other charges, etc., at Neville Island, Pennsylvania	.....	179.51	.....	.....
5. Additional rental for use of plant and of equipment in performance of said contracts	.....	277.35	848.71	719.11
6. Additional cost of materials purchased inside of West Virginia	.....	263.79	.....	.....
7. Additional expenditures for labor inside of West Va.	.....	.....	13,636.23	.....
8. Net expenditures for materials and miscellaneous supplies salvaged and transferred from one location to other locations both within and without West Virginia	2,864.60	.....	.....	.....
9. Net charge for steel piling salvaged and steel piling received from other lock and dam jobs in West Va.	.....	.....	11,876.35	.....
10. Transportation charges on intra-state commerce (freight, towing, etc.)	5,177.98	7,035.63	6,107.83	6,847.05

* The expenditures on the Gallipolis contract are to November 30, 1935 and do not include any expenditures subsequent thereto. The other contracts, Marmet, London, and Winfield were completed prior to November 30, 1935. Total expenditures for the Winfield contract do not reflect miscellaneous minor corrections recorded subsequent to November 30, 1935.

[fol. 743] The Dravo Contracting Company—Addendum Showing Expenditures Additional to those on Page 53 of Stipulation of Facts and Showing Total Expenditures of Plaintiff on Respective Contracts—Continued

	Marmet	London	Winfield*	Gallipolis*
11. Sub-contract work in West Va. (excavation, roofing, coating of lock gates, gunite on piers, glasing, plumbing, drilling test-holes, dredging within coffer, etc.)	3,270.90	6,187.19	14,021.06	127,892.22
12. Cost of travel, telephone, postage, tax on checks, photographs, liquidated damages, etc., both within and without West Va.	6,407.95	14,027.95	10,035.29	11,584.09
13. Salaries of superintendents, engineers and office employees working at construction sites, paid from Pittsburgh Office	22,933.36	29,112.57	40,106.37	65,857.89
14. Insurance—Compensation and Public Liability on work in West Virginia	19,382.23	29,083.66	28,091.28	56,325.77
15. West Virginia Personal Property Taxes	1,175.00	2,060.28	2,691.54	3,788.68
16. West Virginia Gross Income Tax on materials such as boots & miscellaneous materials sold to employees and others	212.66	217.62	7.52	38.93
17. Administration and accounting expense incurred at Neville Island applicable and charged to the erection of gates and other steel work	4,321.37	5,859.63	2,678.60	4,183.74
18. Additional amount expended as shown by total contract, not classified	728.46	1,158.55	1,271.15	.....
Total additional expenditures	67,980.95	96,337.44	133,762.68	277,264.53
Less:				
19. Credit by correction of transportation costs of haulage in interstate commerce	.....	4,592.64	170.31	1,069.64

20. Credit by correction of cost of insurance and other charges, etc., at Neville Island, Penna	362.77	.....	.....	.....
21. Credit by correction of rental for use of plant and equipment in performance of said contracts	1,567.73	.....	.....	.....
22. Credit by correction of cost of materials purchased inside of West Virginia	431.95	.....	.....	525.50
23. Net credit for steel piling salvaged and steel piling received from other lock and dam jobs in West Virginia	17,248.79	20,462.57	.....	33,940.36
24. Net credit for materials and miscellaneous supplies salvaged and transferred from one location to other locations both within and without West Va	.....	39,156.34	42,150.10	2,641.62
25. Credit by correction of amount shown by total contract, not classified	.....	.....	.....	1,687.80
Total Credit Adjustments	19,611.24	74,211.55	42,320.41	39,864.92
Net Additional Expenditures	48,369.71	22,125.89	91,442.27	237,399.61
Total Expenditures	1,000,077.52	1,654,164.51	1,666,116.61*	3,184,395.12*

* The expenditures on the Gallipolis contract are to November 30, 1935 and do not include any expenditures subsequent thereto. The other contracts, Marmet, London, and Winfield were completed prior to November 30, 1935. Total expenditures for the Winfield contract do not reflect miscellaneous minor corrections recorded subsequent to November 30, 1935.

[fol. 745] The table below shows the approximate expenditures made by the plaintiff for materials and supplies outside and within the State of West Virginia, as reflected by the books of the plaintiff. (Purchases of $500.00 or less made outside of the State of West Virginia are not included in the totals given below for out of State expenditures by reason of the intricacies of bookkeeping, but all such amounts are included within and credited to the total of expenditures within the State of West Virginia.)

	Marmet Dam	London Dam	Winfield Locks	Gallipolis Locks
Out of State Expenditures	$534,174.87	$869,739.42	$754,648.23	$1,494,648.07
Expenditures in West Virginia	417,532.94	762,299.20	820,026.11	1,452,347.44

(12)

The gross income received by the plaintiff from the United States during the years 1933 and 1934 under the said government contracts and during the progress of the work thereunder, was the amount agreed to be paid to the plaintiff by the United States by the terms of said contracts, and was [fol. 746] the amount of the bids by the plaintiff for performing said contracts, or for any additional work required by the United States in compliance with said contracts. Competent witnesses for the plaintiff, if called, would testify:

Said bids by the plaintiff ("Appendix B") for each of the respective four contracts were based upon the actual estimated cost of the following items: materials, labor, tools and supplies; transportation of equipment, materials and supplies; superintendence, timekeeping and engineering; watchmen, toolhouse men, water boys, etc.; compensation and liability insurance, construction bond and property taxes; other small incidental expenses. There was also taken into consideration an amount for plant rental on the equipment to be used, based on the valuation of the plant depreciation, repairs and insurance, and cost of rented equipment. In addition to the above items, there was included in the calculations and estimates for the bids the cost of the work at the shops at Neville Island, including actual estimated cost of labor, including shops and drawing rooms; actual estimated cost of materials; and overhead costs, based on percentage of direct labor. To the total of the above items, a percent was added to cover estimated cost of

the general office expense, and to the sum of all these items [fol. 747] was usually added a percent for profit. In its estimates for the London and Marmet contracts no percentage was added for profit; in connection with the Winfield contract a percentage of five per cent (5%) was added for profit, and in connection with the Gallipolis contract a percentage of six per cent (6%) was added for profit.

(13)

Exclusion of Tax from Bids

Said estimated costs, and the bids based thereon, did not include, and there was not included in the contract price paid to plaintiff by the United States, any specified item to cover the West Virginia gross income tax on the amount thereof, although plaintiff at the time knew of the gross sales and income tax law of West Virginia.

[fol. 748] (14)

Experience of Plaintiff in the Construction of Locks and Dams

Plaintiff has been engaged since 1901 in building and constructing locks and dams, principally in the Mississippi River and its tributaries, and in making, fabricating, and supplying the materials and in furnishing the labor therefor. Plaintiff has employed and employs workmen trained and skilled in constructing locks and dams; and has built and acquired, and for many years has owned, maintained, and operated and now owns, maintains and operates, equipment and machinery specially adapted to such construction.

The United States, before entering into said contracts with the plaintiff, was familiar with the experience of the plaintiff company in erecting and constructing locks and dams.

Prior to entering into the Marmet contract aforesaid, the plaintiff had not constructed any roller gate dams, although the plaintiff had constructed the following locks and dams for the United States:

Year	Location
1902	Lock No. 2, Allegheny River, Pittsburgh, Pennsylvania.
1903	Davis Island Back Channel Dam, Ohio River, Stowe Twp.
1904	Lock No. 2, Monongahela River, Bessemer, Pennsylvania.

Year	Location
1905	Dam No. 5, Ohio River, Freedom, Pennsylvania.
1905 [fol. 749]	Lock No. 3, Monongahela River, Elizabeth, Pennsylvania.
1906	Moline Lock, Mississippi River, Moline, Illinois.
1907	Dam No. 2, Allegheny River, Pittsburgh, Pennsylvania. This job consisted of completing a dam which had been started by another contractor.
1907	Lock and Dam No. 14, Black Warrior River, above Tuscaloosa, Alabama.
1907	Lock and Dam No. 15, Black Warrior River, above Tuscaloosa, Alabama.
1911	Lock and Dam No. 15, Ohio River, New Martinsville, West Virginia.
1919	Dam No. 23, Ohio River, Millwood, West Virginia.
1919	Emsworth Lock, Ohio River, Emsworth, Pennsylvania.
1919	Back Channel Dam, Ohio River, Neville Island, Pittsburgh, Pennsylvania.
1919	Main Dam, Ohio River, Emsworth, Pennsylvania.
1922	Lock No. 32, Ohio River, Evansville, Kentucky.
1922	Dam No. 32, Ohio River, Vanceburg, Kentucky.
1923	Lock No. 7, Monongahela River, Greensboro, Pennsylvania.
1926	Dam No. 5, Allegheny River, Schenley, Pennsylvania.
1927	Dam No. 6, Allegheny River, Kelly Station, Pennsylvania.
1928	Daschields Dam, Ohio River, Shields, Pennsylvania.
1928	Lock No. 7, Allegheny River, Kittanning, Pennsylvania.
1931	Lock No. 4, Monongahela River, Monessen, Pennsylvania.
1931	Marmet Lock "B", Kanawha River, Belle, West Virginia.
1932	Dam No. 4, Monongahela River, Charleroi, Pennsylvania.
1932	Roller Gate Dam No. 2, Kanawha River, Marmet, West Virginia.
1932	Lock B and Roller Gate Dam No. 3, Kanawha River, London, West Virginia.
1933	Twin Locks, Kanawha River, Red House, West Virginia.
1933	Gallipolis Twin Locks, Ohio River, Hogsett, West Virginia.

[fol. 750] (15)

The United States knew the character of the equipment of plaintiff's plant, and also knew the qualification and workmanship of the plaintiff's regular employees at the time of entering into the contracts with plaintiff.

The plaintiff sent men experienced in the construction of locks and dams into West Virginia to have charge of and direct the work under the supervision of the executive officers and engineering department of the plaintiff company at Pittsburgh. The names and experience records of the men so sent into West Virginia from places outside said State are as follows:

J. S. Miller, President of the plaintiff company since the year 1935, and since 1922 has had executive charge of all lock and dam construction, together with other general contracting work. Mr. Miller came into the State of West Virginia at various times to directly oversee and supervise the construction of the work at the respective sites. Mr. Miller has had charge of the construction of Dam No. 23 in the Ohio River, together with Lock No. 32, and has been with the plaintiff company since the year 1906.

Edward Weiher commenced work with the plaintiff in 1902 at Lock No. 2, Allegheny River, State of Pennsylvania, [fol. 751] was later made a superintendent and completed Dam No. 23, Ohio River, at Millwood, West Virginia, and also Dam No. 32 at Vanceburg, Kentucky; had charge of the construction of Dams Nos. 5 and 6 in the Allegheny River, State of Pennsylvania, and was sent into West Virginia in charge of the construction of Lock B and the dam at Marmet, in the Kanawha River, and the twin locks near Gallipolis, in the Ohio River.

J. Hippert, in charge of the construction of Dam No. 2, Allegheny River, State of Pennsylvania, in 1908, for the plaintiff; employed by the plaintiff on Lock No. 2, Monongahela River, and in charge of construction of Lock No. 14, Black Warrior River, State of Alabama; and was sent into the State of West Virginia as General Superintendent in charge of all four respective contracts here involved.

R. W. Remp, employed by the plaintiff since 1916, had charge of the construction of the Tacony-Palmyra Bridge over the Wabash River at Terre Haute, Indiana, a bridge at Indianapolis, Indiana, and other bridges in the vicinity of Pittsburgh, Pennsylvania, all of which were of pneu-

matic caisson construction, and also has done other river work in connection with the construction of locks and dams at various places in the United States, and was sent into West Virginia by the plaintiff in charge of the construction of the lock and the roller gate dam at London, West Virginia.

[fol. 752] D. P. Childress worked at Dam No. 32, in the Ohio River, at Vanceburg, Kentucky, and had charge of the construction of Lock No. 7, in the Allegheny River, Pennsylvania, and was sent into the State of West Virginia in charge of the construction of the twin locks at the Winfield Dam, from where he went to take charge of the construction of the dam in the Ohio River near Gallipolis, Ohio.

F. J. Lloyd, Jr., employed by the plaintiff in lock and dam construction at Lock No. 7, Allegheny River, Pennsylvania, in addition to the sinking of pneumatic caissons for bridges at various places in the country, and was sent into the State of West Virginia in charge of the erection of the steel gates at the locks near Gallipolis, in the Ohio River.

C. B. Jansen, now Assistant to the President of the plaintiff and in charge of all field contracts, has been with the company since 1922. He was the Field Engineer at Dam No. 32, in the Ohio River, at Vanceburg, Kentucky, where dams were constructed by means of floating pneumatic caissons. He had charge of the construction of the University Bridge, the Pennsylvania Railroad Bridge, and the Market Street Bridge and Subway, all located on and in the Schuylkill River, the Market Street Bridge and Subway being a combined structure with the bridge over the river and the subway under the river, being constructed on the [fol. 753] same center line. He also had charge of the one and one-half miles long substructure in that part of the San Francisco Bay Bridge connecting Goat Island with Oakland, California, at which place the work was constructed 244.4 feet below low water. In connection with the work by the plaintiff at Winfield and Gallipolis, Mr. Jansen made numerous trips into West Virginia.

V. B. Edwards, Executive Vice-President of the plaintiff, has been with the plaintiff company for twenty-four years, has made a careful study of roller gate design construction and erection, and went to Germany in 1932, to confer with Friederick Krupp Grusonwerk on the special designs for the construction, fabrication, erection and in-

stallation of the roller gates used in the construction of the Marmet and London dams. Mr. Edwards had direct charge of the fabrication of the roller gates and the erection and installation thereof at the respective dam sites in the Kanawha River.

Edward O'Brien has been engaged in steel erection of various kinds, bridges, locks and dams, since 1889, and has been employed by the plaintiff since the year 1915; from 1915 to 1928 was Field Erection Superintendent, and since the year 1928 has been in charge of the shops of the plain- [fol. 754] tiff at Neville Island, Pennsylvania, and in connection with the erection of the first roller gates at Marmet, West Virginia, in the Kanawha River, he was sent from Pittsburgh, Pennsylvania, to Marmet, West Virginia.

A. L. Williams has been employed by the plaintiff since the year 1928 and has been engaged in steel erection of locks and dams and bridges since the year 1911. Mr. Williams had charge of the erection for the plaintiff of the 250 ton hammerhead crane for the Navy Department of the United States, at Bremerton, State of Washington, and he was sent by the plaintiff from Pittsburgh into the State of West Virginia in connection with the erection of the roller gates and lock gates in the Kanawha and Ohio Rivers.

P. M. O'Laughlin, has been employed by the plaintiff since the year 1914 and since the year 1908 has had experience in the erection of bridges, dredges, grain elevators, fifty-ton capacity derrick boats and floating caisson gate and a floating drydock, and he also was sent by the plaintiff into the State of West Virginia in connection with the erection of the roller gates at the respective sites of construction.

R. C. Norris and Olaf H. Scott have been employed by the plaintiff since the year 1927; and Norris since the year [fol. 755] 1919 and Scott since the year 1915, have been engaged in the erection and operation of electrical equipment, particularly in connection with the various classes of equipment built by the plaintiff at its Neville Island Shops, and these two men were sent by the plaintiff into the State of West Virginia in charge of the erection and installation of the necessary electrical equipment used with the roller gates and locks, and the works appurtenant thereto.

In addition to the above named men, other experienced engineers and foremen employed by the plaintiff were sent from other states into the State of West Virginia in con-

nection with the performance of the work under the four several contracts; also other employees as bookkeepers, timekeepers, and clerks, were sent by the plaintiff from other states into the State of West Virginia in connection with these four contracts. All of the above men so sent into West Virginia were paid directly by the plaintiff at its home office at Neville Island, Pittsburgh, Pennsylvania. The number thereof on each of the four contracts, including all of the above classifications, were as follows:

Marmet Contract	17
London Contract	19
Winfield Contract	30
Gallipolis Contract	34

The plaintiff company employed certain skilled, semi-skilled and unskilled or common labor at each of the respec- [fol. 756] tive sites of construction in West Virginia in carrying out the performance of its several contracts, who were paid, as stated aforesaid, at each site of construction after the pay rolls were approved by the plaintiff at its home office at Neville Island, Pennsylvania, the numbers of whom employed on each contract are as follows:

Marmet Contract	Maximum Pay roll 268 Average Pay roll 133
London Contract	Maximum Pay roll 376 Average Pay roll 240
Winfield Contract	Maximum Pay roll 702 Average Pay roll 294
Gallipolis Contract	Maximum Pay roll 700 Average Pay roll 396

Of those employed by the plaintiff at the site of construction at Marmet, twenty-six were former employees of the plaintiff at other places of construction outside of the State of West Virginia; at London, fifty; at Winfield, forty-two, and at Gallipolis, fifty-four. Those employed locally consisted of riveters, welders, carpenters, mechanics, helpers and laborers, which may be classed as skilled, semi-skilled and common workmen. Of those men employed locally, there was one man employed at the London site who was first employed as a mechanic and about eight months later promoted to a job as civil engineer, and there was one man employed at the Winfield site as a core drill inspector

[fol. 757] and about six months later promoted to an assistant civil engineer; outside of these two men there were no regular engineers employed locally.

(16)

Plaintiff stored in warehouses of the plaintiff at Neville Island, Pittsburgh, Pennsylvania, the materials and machinery fabricated, made and shaped by it, and also there stored steel, cement, bolts and certain other like materials purchased by and delivered to it at said Neville Island, until time for delivery at the respective sites of construction.

(17)

Land Owned by the United States

The United States is the owner in fee simple, by purchase or condemnation, of land within the exterior boundaries of the State of West Virginia at the places where said locks and dams were constructed, erected and installed and on a part of which parts of said locks and dams were erected. The United States is the owner in fee of 8.05 acres on the [fol. 758] right bank and 11.86 acres on the left bank of the Kanawha River at the Marmet Lock and Dam. The United States is the owner in fee of 3.2 acres on the right bank and 7.5 acres on the left bank of the Kanawha River at the London Lock and Dam. The United States is the owner in fee of 23.49 acres on the right bank and 14.62 acres on the left bank of the Kanawha River at the Winfield Lock and Dam. The United States is the owner in fee of 9.54 acres on the right bank (in the State of Ohio) and 59.72 acres on the left bank (in the State of West Virginia) of the Ohio River at the Gallipolis Lock and Dam. The United States purchased or acquired said lands for the purpose of the erection of said locks and dams. True copies of the blueprints showing the acreage owned by the United States at each of the above respective sites are filed herewith and made a part of this stipulation, marked "Appendix E," and a true copy of the deed of J. B. Reynolds, widower, to the United States is filed herewith and made a part of this stipulation, marked "Appendix E-1," which deed is typical of the other deeds of conveyance to the United States.

[fol. 759] Plaintiff likewise leased two lots from private owners near Marmet lock and dam, which were occupied

and used from time to time during the construction of the lock and dam in connection with the work, for storing materials and machinery., Plaintiff at times used a roadway across one of the lots in working in, maintaining and removing the temporary forms of the Lock B cofferdam, and also used the roadway from time to time for the purpose of moving steam shovels and other machinery to and from a part of the work when convenient. True copies of the leases, signed by plaintiff's superintendent in charge of the work, are filed herewith and made a part hereof, marked "Appendix E-2." Plaintiff also leased one acre of land from private owners near the Winfield lock, during the construction of said lock, on which to store and did store materials to be used in the construction of a dam in event Dravo Contracting Company should be awarded a subsequent contract for building the dam at Winfield.

No part of the locks or dams is located on the parcels hereinabove referred to.

Plaintiff, in the performance of its work in the years 1933 and 1934, in the construction of said locks and dams, used and occupied only that land on the banks of said rivers owned by the United States (except that for a time the [fol. 760] plaintiff leased two acres from a private owner of land in West Virginia near the Gallipolis lock on which to store material and maintain temporary small buildings), and also the beds of said rivers. As to the use of land at Marmet and Winfield, other than that owned by the United States and the beds of the rivers, evidence will be adduced at the hearing. In the river beds the permanent masonry structures of the respective dams and locks were located, and the plaintiff constructed temporary cofferdams in said rivers. During the said work, the plaintiff maintained floating derricks and barges and other floating equipment on the waters of said rivers, and also placed and used equipment on the walls of said cofferdams, and also stored some materials during the course of construction on said cofferdams.

The United States constructed said locks and dams for the development and improvement of navigation. The said dams were so designed and constructed as to permit the United States to use or license the use of the water power thereby created for generation of electricity. As a result of the construction of said dams, the ship channel in the

Kanawha River was increased from a minimum depth of six feet to a minimum depth of nine feet, and to a width of two hundred feet. The United States Government, by contract dated the 16th day of January, 1934, with the Kanawha Valley Power Company, a private corporation, has granted a license or right to said Power Company to use the water power resulting from the damming of the river at Marmet and at London, under which license the Power [fol. 761] Company constructed and is maintaining and operating necessary buildings, generating plants and equipment for the generation and distribution of electricity by using such water power. The contract between the Kanawha Valley Power Company and the United States is hereby made a part of this stipulation and designated "Appendix F."

(18)

The consent statutes of West Virginia to the acquisition of lands by the United States are contained in Article 1, Chapter 1, of the Code of West Virginia. The construction of said statutes is a matter of law about which the plaintiff and defendant do not stipulate.

(19)

Qualification to do Business

Plaintiff has been registered, qualified, and licensed to do business as a foreign corporation in West Virginia since 1922 and has annually paid all license taxes and fees as [fol. 762] such. In 1933, plaintiff paid such license taxes and fees in the sum of $160.00 and in 1934, $160.00. The taxes involved in this suit are in addition to the above taxes.

(20)

Plaintiff's Business in West Virginia

Prior to 1933 plaintiff made returns of its gross earnings in West Virginia and paid the gross sales tax thereon.

In 1931 and 1932 plaintiff made return of its gross income from contracts with the United States Government for the construction of locks in the Kanawha River at Marmet and London being performed during said years and paid gross income taxes on the proceeds of said contracts received during said years. Said government contracts performed in 1931 and 1932 were separate and distinct from the contracts

between plaintiff and the United States Government involved in this suit, but of the same general character.

In 1933 and 1934 plaintiff performed work for persons other than the United States Government and made returns of its gross income therefrom and paid gross sales taxes [fol. 763] thereon; from January 1 to May 26, 1933, plaintiff returned $628.67 gross income and from May 26 to December 31, 1933, $105.29, on which amount no tax was paid, said amount being exempt under the Act; in 1934 plaintiff returned gross income of $24,200.62, consisting of the proceeds of one contract for grouting at Cabin Creek Junction for the American Gas & Electric Company in the amount of $11,565.30, which said work had no connection with the building of the said locks and dams or any structure appurtenant thereto; the balance being miscellaneous work and sales of supplies. Plaintiff paid the gross income taxes thereon.

In 1933 and 1934 plaintiff also performed work for the United States Government under contracts hereinbefore referred to. In plaintiff's returns for 1933 and 1934 plaintiff stated that the returns excluded the proceeds of these said contracts.

The gross income taxes paid by plaintiff in 1931 and 1932 were of the same nature as the gross income taxes involved in this suit except that the rate was increased by law, effective May 27, 1933, from three-tenths of one per cent to two per cent of the gross income.

[fol. 764] (21)

The said contracts between the United States and the plaintiff set forth and define the relation between the United States and the plaintiff with respect to the supervision, inspection, examination and test by the representatives of the United States in the performance of the work under the said contracts, and representatives of the United States Engineer Office at Pittsburgh, Pennsylvania, were present at all times at the Neville Island shops of the plaintiff at Pittsburgh, Pennsylvania, and representatives of the United States Engineer Offices at Huntington, West Virginia, and Charleston, West Virginia, were present at all times at the sites of construction in West Virginia in the exercise of their duties as such representatives of the United States.

(22)

Property Taxes

In 1933 and 1934 plaintiff paid ad valorem property taxes to the State of West Virginia and its political subdivisions, through the sheriffs of various counties thereof, on its personal property in the aggregate amount of $5,790.62, as follows:

[fol. 765] To the Sheriff of Kanawha County, 1933	$1,912.28
To the Sheriff of Kanawha County, 1934	1,242.12
To the Sheriff of Putnam County, 1934	1,423.50
To the Sheriff of Mason County, 1934	1,212.72
	$5,790.62

Also, during the same period the plaintiff paid to the State of Pennsylvania all taxes due said State under the laws of the State of Pennsylvania.

(23)

Irreparable Loss, Damage and Injury Claimed by Plaintiff

The defendant, unless enjoined and restrained from so doing, will proceed to collect the taxes assessed by him against the plantiff.

A distraint by the defendant upon the plaintiff's property at present used in the plaintiff's work for the United States Government would stop said work or materially interfere therewith.

[fol. 766] In the absence of judicial review, the assessment of the tax by the defendant against the plaintiff for the years 1933 and 1934 is final.

Defendant, while not personally insolvent, is not individually possessed of money or property, real or personal, to the value of $135,761.51, and so far as may be reasonably anticipated, defendant will not be possessed in his personal capacity of available money or property in an amount sufficient to enable him to satisfy any money judgment which might be entered in favor of the plaintiff in any proceeding for the recovery of the taxes assessed against the plaintiff. The official bond of the defendant is in the penal sum of $5,000.00.

(24)

Effect of Stipulation

This stipulation is intended as a statement of the facts upon which the issues shall be determined by the Court, but neither party shall be precluded from producing additional evidence at the trial. The headings or titles of the paragraphs herein are not to be considered as a part of this stipulation.

[fol. 767] Also, the facts herein are to be considered as additional to those facts alleged and admitted or not denied by the pleadings, under Federal Equity Rules of Practice. In case of conflict or variance between the pleadings and this stipulation, the latter shall be taken as true.

The facts herein set out are agreed upon by the parties for the purposes of this cause only, upon the hearing or hearings thereof and any and all appeals or appellate proceedings or review in any court or courts wherein such proceedings may be had or prosecuted; and this stipulation shall not be used to the prejudice of any party hereto in any other proceeding or proceedings now pending or hereafter instituted in any court or courts or in any other way whatsoever.

Each party hereto reserves the right to object to the consideration as evidence of any fact herein stipulated upon the ground of the irrelevancy or immateriality of any such fact.

Dated this 11th day of August, 1936.

[fol. 768] The Dravo Contracting Company, Pittsburgh, Pennsylvania, Plaintiff, by W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Plaintiff. Fred L. Fox, Individually and as State Tax Commissioner of the State of West Virginia, Defendant, by Homer A. Holt, Attorney General of West Virginia, Counsel for Defendant.

[fol. 769] STIPULATION—APPENDIX "A"

(Here follow two photos, side folios 770 and 771)

ADDRESS REPLY TO
U. S. ENGINEER OFFICE
HUNTINGTON, W. VA.

REFER TO FILE NO. _____

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
13TH FLOOR, COAL EXCHANGE BUILDING
HUNTINGTON, WEST VIRGINIA

December 28, 1933.

OFFICE CHIEF OF ENGINEERS
JAN 8 - 1934
3524(Kanawha River-Winfield L/D)-243

Subject: Change Order No. 1, Contract No. W516eng.-726, Winfield Locks, Kanawha River.

JAN 18 1934

The Bravo Contracting Company,

Neville Island Station,

Pittsburgh, Pa.

Gentlemen:

Reference is made to Article 3 of your Contract No. W516eng.-726, dated October 24, 1933, for constructing the Winfield Locks and appurtenant works, Kanawha River, Red House, W. Va.

It has been determined that in order to carry out the intent of Section 203, National Industrial Recovery Act, and provide employment at once for shop employees doing work under this contract, it is necessary and in the best interests of the United States to modify said contract in certain particulars as follows:

Paragraphs 7-08, 8-08 and 9-21 of the specifications are modified by substituting the method of payment and provisions for storage and protection stated below for the method and provisions stated in the specifications:

> Estimates of 30 per cent will be made on delivery of materials at the shop in which they will be fabricated, 30 per cent for fabrication, and the remaining 40 per cent when all the materials have been installed, tested and accepted. The contractor will provide proper storage at his own yard, and at his own expense, for fabricated materials until time for delivery. If any of the materials, for which partial payments have been made, are not stored and protected in a manner satisfactory to the contracting officer, no further partial payments as provided in this paragraph will be made, and the materials will be kept protected by the contracting officer at the expense of the contractor.

Paragraph 5 (c) will be modified in accordance with the above payment schedule.

No other requirements of the specifications are affected by this change order.

It is understood and agreed that on account of the foregoing modification additional time will not be allowed.

It is further understood and agreed that all other terms and conditions of said contract shall be and remain the same.

This change order involving a change in the specifications does not become effective until approved by the Chief of Engineers.

Therefore, if the foregoing modification of said contract is satisfactory, please note your acceptance thereof in the space provided below.

Yours very truly,

United States Engineer Department

Fred W. Herman

Fred W. Herman,
Major, Corps of Engineers,
District Engineer.

The foregoing modification of said contract is hereby accepted.

1st Ind.

The Dravo Contracting Company

To the District Engineer, Huntington, W. Va.

By J. S. Miller

J. S. Miller, Vice President.

for notation and delivery to the contractor.

O. C. of E. JAN 13 1934

Approved _____, 193 .

Approved JAN 11 1934

_____
Chief of Engineers

G. R. Pillsbury,
Brigadier General,
Acting Chief of Engineers.

771

38618

[fols. 772-784] STIPULATION—APPENDIX "B"

[fol. 785] London

No. —. Bidder —— ——. Serial No. 33-59

(Do not write above this line)

Standard Government Form of Invitation for Bids

(Construction Contract)

War Department, U. S. Engineer Office

Huntington, W. Va., September 15, 1932.

Sealed Bids, in duplicate, subject to the conditions contained herein, will be received until 10:00 A. M. (Eastern Time), October 15, 1932, and then publicly opened, for furnishing all labor and materials and performing all work for constructing the second (Lock "B") of the twin locks, a roller-gate dam, alterations to the upper miter-gate of the existing Lock "A", a power house on the river wall of Lock "A", and furnishing and installing the power house machinery and lock illumination system, at the London Lock and Dam, Kanawha River, West Virginia.

This work is to be undertaken under an appropriation for the purpose of accelerating such governmental construction projects as will increase public employment during the present emergency.

Employees.—The provisions of Section 307 of the Emergency Relief and Construction Act of 1932, will be incorporated in the contract. (See Par. 7 of the specifications.)

The plans which will become a part of this contract are designated in paragraph 3 of the specifications.

Where copies of plans are requested, a deposit of $35.00 will be required to insure their return. The deposit should be in the form of a United States money order or a certified check made payable to "The Disbursing Officer, U. S. Engineer Office, Huntington, W. Va.".

Guaranty will be required with each bid as follows: Bid bond, standard Form No. 24, will be executed in a penal sum

approximately equal to or not less than 10 per cent of the total amount of the bid. Individual sureties will justify in sums aggregating not less than double the penalty of the bid bond. (See Pars. 8-11, inclusive, of Instructions to Bidders).

[fol. 786] Performance bond will be required as follows: Standard Form No. 25 will be executed in a penal sum approximately equal to and not less than 50 per cent of the full amount of the consideration of the contract. Individual sureties will justify in sums aggregating not less than double the penalty of the performance bond.

Liquidated damages for delay will be prescribed. (See Par. 6 of the specifications).

Partial payments will be made. (See Par. 10 of the specifications and article 16 of the contract).

Articles on patents will be made a part of the contract. (See Par. 27 of the specifications).

Bids must be submitted upon the standard Government form of bid and the successful bidder will be required to execute the standard Government form of contract for construction.

Experience.—(a) After the bids are opened, any bidder may be required by the contracting officer to state whether he is now or ever has been engaged on any contract or other work similar to that proposed, the year in which it was done, and the manner of its execution, and to give such other information as will tend to show his ability to prosecute vigorously the work required by these specifications.

(b) For the design of the roller gates required under Section XIII, the successful bidder will be required to employ an organization thoroughly experienced in the design of high grade hydraulic gates of large dimensions and their machinery, for use in power or navigation dams.

(c) For the installation of the roller gates, the successful bidder will be required to employ an organization thoroughly experienced and skilled in the fabrication and erection of steel structures requiring a similar high degree of precision and workmanship. After the opening of bids, any bidder may be required by the contracting officer to submit satisfactory evidence that the specific organization which he proposes to employ on this portion of the contract has successfully executed work of the nature and quality indicated above.

Information to be Submitted with Bid.—(1) The drawings, charts, statement of plant, and other information re-
[fol. 787] quired below, shall be carefully prepared and presented in neat and legible form. These data are considered essential in assisting the contracting officer to determine whether or not the bidder is responsible, experienced in similar types of construction, and that his bid is based on a careful study of construction methods applicable to the work and full realization of the various factors which may affect its progress.

(2) A drawing or drawings showing the plant layout the bidder proposes to utilize on the work. The drawing shall clearly indicate the location and manner of employment of the various major items of plant, such as the location of material yards, disposition for the handling of materials, location of tracks, the manner in which excavation will be removed and fill placed, the location of mixing plants, and the manner in which concrete will be placed and metal work erected. The layout shall be indicated distinctly for work in each cofferdam. This plant layout shall be accompanied by a complete list and description, inserted in the space provided therefor in the bid form, of all plant that the bidder now has or will have available for this work, and its location at the time of opening of bids, in order that it may be inspected by the contracting officer should he so desire. The above information will be considered confidential.

(3) There shall also be submitted a chart indicating the volume of work to be done and the rate of progress which the bidder agrees to maintain for each of the following major operations required in the performance of the work under these specifications:

1. Cofferdams.
2. Excavation (including foundations).
3. Concreting.
4. Construction of power house on river wall of Lock "A".
5. Installation of power house equipment and lock illuminating system.
6. Installation of roller gates (including operating machinery).
7. Installation of miter gates and lock valves.
8. Erection of service bridge.
9. Alterations to upper miter gate of Lock "A".

Pertinent items shall be indicated separately for the lock and the dam. The chart shall be in the form of plotted curves for which the abscissas shall represent definite intervals of time measured from the date of notice to proceed [fol. 788] with the work, and the ordinates shall represent percentages of completion based on the estimated contract quantities. In preparing the charts, due allowance shall be made for probable delays caused by high water and inclement weather.

(4) Bidders shall state, in the spaces provided therefor, the names and addresses of the organizations by whom the roller-gate plans will be prepared, and the gates fabricated and erected. They shall also submit with their bids, conclusive evidence of compliance by the roller-gate design organization with the requirements of subparagraph (b) under "Experience," above. Failure to submit this evidence will be sufficient cause for rejection of a bid.

(5) Each bidder shall also submit with his bid the data sheets attached to the bid form properly filled in, together with descriptive information, dimensioned drawings or cuts, and catalogue data, in duplicate, so as clearly to indicate the size, weight, capacity, rating, type and material of each item in question. The name of one manufacturer only shall be entered against any item. The term "or equal" shall not be used by the bidder in describing equipment to be furnished.

Investigation of Conditions.—Samples of core borings taken at the lock site are on hand at Lock No. 3, Glasgow, W. Va., Kanawha River, where they should be inspected by prospective bidders. It is expected that bidders will visit the site and acquaint themselves with all available information concerning the nature of the materials that will be encountered in the river bed, the depths to which it may be necessary to excavate in order to secure satisfactory foundations, the possibility that the river bed or banks will change from natural causes prior to or after commencement of the work, and the local conditions having a bearing on transportation facilities and handling and storage of materials. Failure to acquaint himself with all available information concerning these conditions will not relieve the successful

bidder of assuming all responsibility for improperly estimating the difficulties entering into and costs of performing the complete work as required.

Bid and Contract.—The bid form has an entry for each item on which estimates will be given or payments made, and no other allowances of any kind will be made unless specifically provided for in the specifications or the contract, or adjustments under Article 3 of the contract.

All bids must be for the entire work and must have each blank filled.

[fol. 789] The quantities of each item of the bid, as finally ascertained at the close of the contract, in the units given and the unit prices of the several items stated by the bidder in the accepted bid, will determine the total payments to accrue under the contract. The unit price bid for each item must allow for all collateral or indirect cost connected with it.

Award of Contract.—Subject to the rights hereinafter reserved, the work will be awarded as a whole to one bidder.

A bid may be rejected if a bidder fails to submit the information and furnish the guaranty required with his bid, or cannot promptly show to the satisfaction of the contracting officer that he has the necessary capital and experience, and owns or controls the necessary plant to perform the work, and that he is not already obligated for the performance of as much work as he will probably be able to complete during the period contemplated by this advertisement.

Any unbalanced bid, which, in the opinion of the contracting officer, jeopardizes the interests of the United States will be subject to rejection for that reason.

The land on the abutment end of the dam (shown on drawing 10/4) is not yet in the possession of the United States. It is anticipated that the right of entry to this land will be obtained about November 1, 1932. The right is reserved to withhold award until this right of entry has been obtained.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Envelopes containing bids must be sealed, marked and addressed as follows:

Bid for London Lock and Dam,
Kanawha River,
To be opened October 15, 1932.

The District Engineer,
U. S. Engineer Office,
P. O. Box No. 1780,
Huntington, W. Va.

NOTE.—See Standard Government Instructions to Bidders and copy of the Standard Government Form of Contract, Bid Bond and Performance Bond, which may be obtained upon application.

[fol. 790] Standard Government Form of Bid

(Construction Contract)

(Place:) Pittsburgh, Pa.,

(Date:) October 12, 1932.

To the District Engineer, U. S. Engineer Office, P. O. Box 1780, Huntington, W. Va.

In compliance with your invitation for bids dated Sept. 15, 1932, and subject to all the conditions thereof, the undersigned, The Dravo Contracting Company, a corporation organized and existing under the laws of the State of Pennsylvania, [a partnership consisting of or an individual trading as]* of the city of Pittsburgh, Pa., hereby proposes to furnish all plant, labor and materials, and perform all work required for the construction of the second (Lock "B") of the twin locks, a roller-gate dam, alterations at the upper gate of Lock "A", a power house on the river wall of the locks; the furnishing and installing of the power house machinery, tow-haulage units, and lock illumination and signal light systems; all other work indicated on the drawings or required by the specifications, and incidental work needed or ordered in writing by the contracting officer; at London Lock and Dam, Kanawha River, in strict accordance with the specifications, schedules and drawings, for consideration of the unit prices listed in schedule below.

[*Struck out in copy.]

Item No.	Approximate Quantities	Unit	Designation	Unit Price	Total
1.	1,134	Lin. Ft.	Cofferdam—Lock "B", per linear foot of permanent work inclosed	36.00	40,824.00
2.	584	Lin. Ft.	Cofferdam—Dam, per linear foot of permanent work inclosed	100.00	58,400.00
3.	Sum	Sum	Cofferdam—Auxiliary (work in Lock "A")	3,000.00	3,000.00
[fol. 791]					
4.	151,000	Cu. Yd.	Excavation—Common	0.70	105,700.00
5.	5,700	Cu. Yd.	Excavation—Rock	3.00	17,100.00
6.	24,300	Sq. Ft.	Channeling—Rock	0.60	14,580.00
7.	1,400	Lin. Ft.	Drilled Holes—Grouting—1st 10 feet	1.00	1,400.00
8.	500	Lin. Ft.	Drilled Holes—Grouting— 2d 10 feet	1.20	600.00
9.	400	Bbl.	Grouting	8.00	3,200.00
10.	35,000	Cu. Yd.	Fill	0.30	10,500.00
11.	8,500	Lin. Ft.	Piling—Round Timber	0.50	4,250.00
12.	15,600	Sq. Ft.	Piling—Steel Sheet	1.00	15,600.00
13.	42	M.B.M.	Timber—Oak	120.00	5,040.00
14.	25	M.B.M.	Timber—Yellow Pine—Creosoted	130.00	3,250.00
15.	15,300	Cu. Yd.	Concrete—Class "A"	9.00	137,700.00
16.	58,000	Cu. Yd.	Concrete—Class "B"	7.30	423,400.00
17.	1,824,000	Pound	Steel—Structural	0.047	85,728.00
18.	368,600	Pound	Steel—Nickel	0.07	25,802.00
19.	3,400	Pound	Steel—Cold-rolled	0.12	408.00
20.	492,000	Pound	Steel—Reinforcing	0.04	19,680.00
21.	29,400	Pound	Forgings—Steel	0.12	3,528.00
22.	281,000	Pound	Castings—Steel—Class "A"	0.06	16,860.00
23.	105,000	Pound	Castings—Steel—Class "B"	0.10	10,500.00
24.	12,400	Pound	Castings—Steel—"Nickel"	0.12	1,488.00
[fol. 792]					
25.	11,800	Pound	Castings—Iron	0.15	1,770.00
26.	24,300	Pound	Bolts	0.09	2,187.00
27.	1,400	Pound	Bronze	0.50	700.00
28.	3,800	Pound	Babbitt Metal	0.30	1,140.00
29.	4,700	Pound	Pipe—Cast Iron	0.08	376.00
30.	58	Lin. Ft.	Pipe—Steel—6-inch	2.50	145.00
31.	600	Lin. Ft.	Pipe—Vitrified Clay—12-inch	1.50	900.00
32.	Sum	Sum	Pipe—For hydraulic operation system and water, gas, gasoline and oil supply lines	9,000.00	9,000.00

Item No.	Approximate Quantities	Unit	Designation	Unit Price	Total
33.	4,630	Lin. Ft.	Conduit—Fibre—3-inch	0.20	926.00
34.	176	Lin. Ft.	Conduit—Fibre—4-inch	0.25	44.00
35.	160	Lin. Ft.	Conduit—Metal—1-inch	0.30	48.00
36.	1,860	Lin. Ft.	Conduit—Metal—1½-inch	0.35	651.00
37.	150	Lin. Ft.	Conduit—Metal—2-inch	0.60	90.00
38.	3,950	Lin. Ft.	Conduit—Metal—2½-inch	0.66	2,607.00
39.	1,500	Lin. Ft.	Conduit—Metal—3-inch	0.80	1,200.00
40.	820	Lin. Ft.	Handrailing—Pipe	1.90	1,558.00
41.	2	Each	Stoney Gate Valves—complete	12,000.00	24,000.00
42.	4	Each	Operating Machines—Lock Gate	3,500.00	14,000.00
43.	Sum	Sum	Power House	17,000.00	17,000.00
44.	Sum	Sum	Machinery—Power House	19,000.00	19,000.00
45.	2	Each	Tow-Haulage Units	1,500.00	3,000.00
46.	5	Each	Roller-Gates—Complete with Operating Machinery	66,000.00	330,000.00
[fol. 793]					
47.	5	Each	Operating Houses (On Dam Piers)	2,600.00	13,000.00
48.	565	Trk. Ft.	Crane Track—50-lb. Rail	1.80	1,017.00
49.	565	Trk. Ft.	Crane Track—80-lb. Rail	2.60	1,469.00
50.	Sum	Sum	Revolving Locomotive Crane—Electric	25,000.00	25,000.00
51.	Sum	Sum	Bridge-Crane Unit—Electric	7,500.00	7,500.00
52.	Sum	Sum	Electric Wiring, Illumination and Control Equipment	19,800.00	19,800.00
53.	Sum	Sum	Alterations at Upper Gate of Lock "A"	2,000.00	2,000.00
54.	Sum	Sum	Removal of old rock-filled timber-crib ice breaker	1,300.00	1,300.00
			Contingent Work		
55.	40,000	Cu. Yd.	Excavation—Common	0.30	12,000.00
56.	6	Cu. Yd.	Excavation—Rock	6.00	36.00
57.	120	Sq. Ft.	Channeling—Rock	1.00	120.00
58.	11,600	Cu. Yd.	Fill	0.25	2,900.00
59.	5,200	Cu. Yd.	Stone—Riprap and Derrick	1.00	5,200.00
60.	1,380	Lin. Ft.	Piling—Round Timber	0.30	414.00
61.	22,200	Sq. Ft.	Piling—Steel Sheet	0.70	15,540.00
62.	22	M.B.M.	Timber—Common	50.00	1,100.00
63.	240	Cu. Yd.	Concrete—Class "A"	8.00	1,920.00
64.	280	Cu. Yd.	Concrete—Class "B"	9.00	2,520.00

65.	83,500	Pound	Steel—Structural	0.04	3,340.00
66.	6,600	Pound	Steel—Reinforcing	0.04	264.00

[fol. 794]

67.	2,200	Pound	Bolts	0.06	132.00
68.	59,300	Pound	Pipe—Cast Iron	0.03	1,779.00
69.	157	Trk. Ft.	Crane Track—50-lb. rail	2.00	314.00
70.	2	Each	4-wheel Trucks	800.00	1,600.00
71.	Sum	Sum	Electrical Wiring	280.00	280.00
	Total				$1,559,425.00

Note, Alternate to Item 46:
If Flap Type overflow gate is adopted, add lump sum 12,500.00 to total of Item 46, see specifications on file in U. S. Engr. Office.

NOTE.—All Amounts and totals given above will be subject to verification by the United States. In case of variation between unit bid price and totals shown by bidder the unit price will be considered to be his bid.

[fol. 795]

Plant to Be Used on the Work

(See Invitation for Bids)

Use separate line for each major item.
Specify whether land or floating equipment.

Excavating & Dredging

No.	Name	Kind	Capacity	Age and Condition
1.	2 Derrick Boats	Whirler type, Steel	75-ton	Good
2.	2 Dump Scows	Steel	150-yds. Part time	"
3.	2 Cranes	Whirler type—Lock	10-ton	"
4.	3 Barges	Steel	300-600 ton	"

All of the above plant is modern and in good repair.

Pile Driving

6.	2 Sets leads	Swinging	30 to 40'	Good
7.	1 Hammer	McKiernan-Terry	#9 B.2	"
8.	1 "	" "	#7	"
9.	1 Puller	Vulcan	#4	"

Drilling

10.	2 Compressors	Motor driven	600' each	Good
11.	1 Channeler	Power driven		"
12.	All necessary Jack Hammers, Drills, etc.			

[fol. 796]

Concreting

18.	Land Plant	Dravo type	2–2 yd.	Good
19.	Mixer Boat #6	All Steel	2 yd.	"
20.	10 Buckets	Dravo type	2 yd.	"
21.	All miscellaneous small plant needed, including Weighing Batchers for all materials except water, which will be measured.			

Material Handling

No.	Name	Kind	Capacity	Age & Condition
28.	1 Yard Crane	Whirler type	10-ton	Good
29.	1 Crane, feeding mixer	" "	"	"
30.	2 Cranes, Lock	" "	"	"
31.	2 " , Dam	" "	"	"
32.	1 " , "	" "	"	"
33.	All necessary Buckets, etc.			

Pumping

36.	2 Vertical Pumps	Motor driven	15"	Good
37.	2 " "	" "	10"	"
38.	2 " "	" "	6"	"
39.	2 Small Pumps	" "	2" to 4"	"
40.	2 " "	" "	" "	"

[fol. 797]

Miscellaneous

41. All miscellaneous plant necessary for the prompt execution of the work will be provided, in fact, is available at short notice.

Experience (See "Information to be Submitted" in Invitation for Bids.)

Name, address, and experience of organization by whom the roller-gate plans will be prepared:

The designs and plans for the roller gate installation will be prepared by Fried. Krupp Grusonwerk, Magdeburg, Germany, which organization is re-ponsible for similar designs and plans and actual successful installations on the Neckar and Main Rivers and other tributaries of the Rhine River, Germany.

[fol. 798] Name, address, and experience of organization by whom the roller gates will be fabricated and/or erected:

The roller gates will be fabricated by the Engineering Works Department of The Dravo Contracting Company, Neville Island Shops, Pittsburgh, Pa., and erected by this same organization, whose experience for the fabrication and erection of engineering works of this character is a matter of record with the United States Engineer Corps—War Department.

The undersigned agrees, upon receipt of written notice of the acceptance of this bid within 60 days after the date of opening of the bids, to execute the standard form of Government contract, in accordance with the bid as accepted, and give bond, with good and sufficient surety, or sureties, for the faithful performance of the contract, within 10 days after the prescribed forms are presented for signature.

Performance will begin within 10 calendar days after date of receipt of notice to proceed and will be completed as specified in *paragraph 6 of specifications.*

The Dravo Contracting Company, by J. S. Miller, Vice-President, (Business address:) Neville Island Station, Pittsburgh, Pa.

Attest: Wm. H. Fowler, Secretary. (Seal.)

NOTE.—Read Standard Government Instructions to Bidders before preparing this bid.

[fol. 799] Data Sheet for Gasoline-Electric Generating Unit

(To be filled in by bidders)

Sheet 1 of 2

1. Engine: (Manufacturer) Sterling Engine Co.

No. Cylinders: 8.

Bore and Stroke: 5¾ x 6¾.

Brake M. E. P. and Piston Speed at Rated Output: 112# per sq. in. 1350 ft./min.

Lbs. Fuel per K. W. Hr. @ 125% Rated Output of Generator: 1.021.
Lbs. Fuel per K. W. Hr. @ 100% Rated Output of Generator: 1.08.
Lbs. Fuel per K. W. Hr. @ 75% Rated Output of Generator: 1.08.
Lbs. Lubricating Oil per K. W. Hr. @ 100% Rated Output of Generator: .04.
Carburetor (Make, Number, Size): Schebler or Zenith 2½".
Muffler (Make): M 2 Maxim Silencer 5".
Ignition System (Make, Type, Voltage): North East—12 volts. 3 distributors and coils.
Starter (Make): North East.
Generator (Make and Capacity): North East 150 Amp.
Battery Charger (Make and Type): Westinghouse, as specified.
Net Weights: Engine, 2900 Pounds.
Generator and Exciter, 3450 Pounds.
Complete Unit, including Common Base, 8700 Pounds.
Heaviest Part to be Handled During Erection, 3450 Pounds.
Shipping Weight (Complete Unit): 9500 Pounds.

2. Electric Generator: (Manufacturer) Westinghouse Electric & Mfg. Co.

Rating: 156 K. V. A., 1200 R. P. M., 3 Phase, 60 Cycles, 6 Poles
480 Volts, 188 AMPS., 80% P. F. (Lagging).
Insulation: Stator, Class A. Rotor, Class A.

[fol. 800] Sheet 2 of 2

Temperature Rise, Continuous Operation at Full Load 40°C. Armature.
and 0.8 P. F.: 50°C. Fields.
Shunt-Wound Exciter Rating: 2.7 K. W., 125 Volts.
Efficiency, at 80% lagging power factor, as determined in accordance with A. I. E. E. standardization rules, will not be less than the following:
Full Load 92.8%—¾ Load 92.4%—½ Load 91.7%.
Spare Parts and Accessories: As per specifications, including necessary tools for engine maintenance.

[fol. 801] Data Sheet for Tow-Haulage Units

(To be filled in by bidders)

Sheet 1 of 2

1. Hoist (Manufacturer): Lidgerwood Mfg. Company.

Line pull: 4000 pounds @ 100 ft. per minute.
Drum:
(a) Length, 20½ inches.
(b) Diameter of barrel, 10 inches.
(c) Diameter of flanges, 20 inches.
(d) Capacity of ½-inch cable, 1000 feet.
Friction Clutch:
(a) Type (internal expanding or cone) Cone.
(b) Lining (material and type) Seasoned maple—cork inserted.
Gearing:
(a) Pinions (material) Forged steel.
(b) Gears (material) Cast steel.
Bed Plate (material and type) C. I.—box section.
Type of lubrication (pressure gun or grease cups) Alemite—pressure gun.
Type of motor drive (gear or silent chain) Gear.
Overall dimensions: Length 4'4" x width 3'6¾".
Weight: 3500 pounds.

2. Motor (Manufacturer): Westinghouse Electric & Mfg. Co.

Horse Power, 15.
Full Load R.P.M., 1140.
Efficiency, 85%.

[fol. 802] Sheet 2 of 2

Time rating and temperature rise: ½ hours, 50 degrees C.
Starting torque: 225% full load torque.
Pull-out torque: 250% full load torque.
Class of insulation: Stator "A". Rotor "A".
Bearings (type): Cartridge type, Ball bearings. Interchangeable: Not front and rear.
Frame Construction (type and material): Cast iron—feet integral.

Brush holders (material): Brass.
Slip rings (material): Brass alloy.
End brackets (material): Cast iron.
Terminal box covers (material): Cast iron.

3. Drum Controller (Manufacturer): Westinghouse Electric & Mfg. Co.

Number of steps: 11.
Is no voltage protection provided? Yes.
Overload relay: Manufacturer Westinghouse Elec. & Mfg. Co. Type TA2.
Resisters (type of starting duty A.E.S. standard): Class 94—cast grid alloy.

Wiring:

(a) Control As per specifications—Par. 2-08.
(b) Resister connections Rockbestos Cable.
(c) Incoming and motor connections Rome "Super-Service".

Disconnecting power plugs: Crouse-Hinds AJA 61104.

Housing for controller:

(a) Material: Sheet steel.
(b) Construction: Welded.

[fol. 803]

Data Sheet for Lock Exterior Lighting and Signal Lighting Equipment

(To be filled in by bidders)

(1) Lock Lighting Equipment:

Equipment	Manufacturer	Type
Lighting Standard	Electric Rwy. Equipment Co.	As specified
Lighting Unit Complete	Holophane	#04177A S.F.
Pipe Fittings	As required	
Junction Boxes	General Cable Corp.	Dwg. A13423 (attached)
Wire and Cable	Rockbestos Products Corp.	Heavy Duty Cab Cord
Fuses	Bussman Mfg. Co.	Super-Lag
Connector Plug	Crouse-Hinds	B P

(2) Lock Signal Lighting Equipment:

Equipment	Manufacturer	Type
Signal Light Standard	None required as specified on Drawing 29/12	
Signal Light Unit	"	"
Flood Lights	"	"
Transformers	"	"
Pole Clamps and Fittings	"	"
Wire and Cable	Phelps-Dodge Corp.	As specified
Connector Plugs	Crouse-Hinds	B P

[fol. 804] Switchboard Data Sheet

(To be filled in by bidders)

Sheet 1 of 2

(1) Power House Switchboard:

Manufacturer: Westinghouse Electric & Mfg. Co.

Equipment	Manufacturer	Type
Air Circuit Breakers, Manually Operated	Westinghouse	AB
Oil Circuit Breakers, Manually Operated	Westinghouse	F-11
Voltage rating 5000 Amperes 400 2-o.c.o. interrupting capacity 1500 at 480 volts.		
Knife Switches, double throw	Westinghouse	AL
Knife Switches, single throw	Westinghouse	AL
Generator and Exciter Rheostats	Westinghouse	
Voltage Regulator	Westinghouse	AE-1
Voltmeters and Ammeters	Westinghouse	HA
Watt Meter	Westinghouse	HY
Watt-Hour Meter	Westinghouse	OB
Totalizing Graphic Wattmeter	Esterline-Angus	AW
Instrument Transformers	Westinghouse	VS-Potential KO-Current
Instrument Switches	Westinghouse	W
Terminal Blocks	Westinghouse	Moldarta
Master Control Switches	Westinghouse	W
Air Signal Control Switch	Westinghouse	W
Fuses, N.E.C.	Bussman	Super-Lag
Switchboard Wire	Rockbestos	Switchboard Wire
Distribution Transformers (lighting)	Westinghouse	[illegible]R

[fol. 805]

Sheet 2 of 2

Magnetic Contactors	Westinghouse	F
Reverse Phase Relay	Westinghouse	CP
Auxiliary Relay	Westinghouse	MC
Bus Bars	Westinghouse	Copper Strap
Indicating Lights	Westinghouse	Standard
Thermal Overload Relays	Westinghouse	CO
Timing Relay	Westinghouse	TG
Material of Panels	Westinghouse	Stretcher level
Wire	Rockbestos	Switchboard Wire

[fol. 806]

Data Sheet for Incoming Line and Miscellaneous Control Equipment

(To be filled in by bidders)

Equipment	Manufacturer	Type
Remote Control Stand	The Dravo Contracting Co.	As specified
Cable Terminators, 600 volt	General Cable Corp.	323-B Type B & C 383 B (Dwg-B-13320 attached)
Power Cable (*)	Rockbestos Products Corp.	In houses and on Service Bridge
Control Cable	Phelps-Dodge Corp.	In Lock Walls
Lighting Cable	Phelps-Dodge Corp.	As specified
Master Switches	Westinghouse	W
Push Buttons	Westinghouse	
Solenoid Control for Whistle	Westinghouse	Special

* Note on Power Cable: Cable manufacturers will not quote on 500,000 CM cable made in rubber-insulated cable as per Par. 2-09(b) with sector shaped conductors. This proposal is based on round concentric lay conductors in rubber. Paper insulated "sector" type can be substituted, if desired.

Data Sheet for Incoming Line and Miscellaneous Control Equipment—Continued

Equipment	Manufacturer	Type
Fuses, N.E.C.	Bussman	Super-Lag
200 Watt Auto Transformers	None required	
Rigid Steel Conduit and Fittings	Youngstown Sheet & Tube Co.	"Buckeye"
Flexible Steel Conduit	National Electrical Products Co.	Flexsteel
Control Cable Junction Boxes	General Cable Corp.	E and NEF
Cable Hangers	Minerallac Electric Co.	Cable type
Cable Troughs	The Dravo Contracting Co.	As specified
Cable Vertical Supports	G. & W. Electric Specialty Co.	No. 224
Steel Conduit Boxes	Appleton Electric Co.	PTC

[fols. 807-986] Data Sheet for Air Compressor Unit and Air Signal

Air Compressor Unit:

(a) Manufacturer Westinghouse Traction Brake Co. Type N.B.-4-10.
(b) Capacity 25 cu. ft. free air per minute.
(c) Piston Displacement 35 cu. ft.
(d) R.P.M. 213.
(e) Automatic Control Westinghouse type 11-200 across the line starter. Cutler Hammer gage type Pressure Regulator #10014.
(f) Size and Type of Receiver 30½" x 96" in accordance with A.S.M.E. Code.
(g) Motor:
  (1) Manufacturer Westinghouse Electric & Mfg. Co.
  (2) Type "CS" Voltage 440 R.P.M. 1745.
  (3) Running Amp. 12 Full load eff. 89%.
  (4) Class of Insulation Mfgr. Std. ASEE and NEMA Codes.

Air Signal:

(a) Manufacturer Westinghouse Air Brake Co. Type A-1.
(b) Operating pressure 100 Pounds.
(c) Free air required per second of operation 0.40 cu. ft.

[fols. 987-988] STIPULATION—APPENDIX "E-1"

[fol. 989] Copy

#2109. L. H.

J. B. REYNOLDS

to

UNITED STATES OF AMERICA

This Deed, made the 25th day of September, 1933, between J. B. Reynolds, widower, of Marmet, West Virginia, party of the first part, and The United States of America, party of the second part.

Witnesseth, That for and in consideration of the sum of Four Thousand Three Hundred ($4,300.00) Dollars, cash in hand paid by the party of the second part to the party of the first part, receipt of which is hereby acknowledged, the said party of the first part does hereby grant, sell and convey unto the said party of the second part, its successors and assigns, all that certain tract or parcel of land, situate, lying on the left bank of the Kanawha River, just above U. S. Lock No. 5 in Louden District, Kanawha County, West Virginia, including lots Nos. 30, 31, 33, 34, 35, 36, 37, 38 and 39, of the Loche Haven Subdivision, as shown on a map filed and recorded in the office of the [fol. 990] Clerk of the County Court of Kanawha County, West Virginia, in Map Book No. 3, page 23, the whole trace of which is bounded and described as follows:

Beginning at a point, marked by an iron pin, at the northwest corner of Lot No. 39, which point is also located south 32 degrees, 44 minutes, 30 seconds west, 327.74 feet from U. S. Bench Mark No. 250, of the Kanawha River Survey at Lock No. 5; thence running from said point of beginning, north 60 degrees, 22 minutes east, 410.09 feet to the low water mark of the Kanawha River, thence up the river along and with the low water mark, south 28 degrees, .02 minutes east, 206.09 feet to the boundary line between the Loche Haven Addition and the land of A. J. Baker, thence along and with said boundary line, south 60 degrees, 32 minutes west, 415.53 feet to a point, marked by an iron pin, at the southwest corner of Lot No. 35, thence along the line of an alley, north 26 degrees, 30 minutes

west, 205.1 feet to the place of beginning, containing 1.95 acres, being a part of the property conveyed to the said J. B. Reynolds by E. Chase Bare, Trustee, by deed dated January 15, 1918, recorded in the Office of the Clerk of the County Court of Kanawha County, West Virginia, in Deed Book No. 180, at page 377, reference to which deed and the aforesaid map is hereby made for further description and identification of the property herein conveyed.

[fol. 991] To Have and to Hold the hereinbefore described and the hereby conveyed premises unto the United States of America, its successors and assigns, forever, together with all the tenaments, hereditaments and appurtenances thereunto belonging or in any wise appertaining, subject, nevertheless, to the following easements or rights of way, viz:

(a) A right of way for pipe lines, granted by J. B. Reynolds and wife to the Clayco Gas Company by deed dated September 3, 1925, recorded in the Office of the Clerk of the County Court of Kanawha County, West Virginia, in Deed Book No. 293, at page 459.

(b) A right of way for pipe lines, granted by J. B. Reynolds and wife to the Clayco Gas Company dated July 5, 1926, recorded in said Clerk's Office in Deed Book No. 305 at page 297.

(c) A right of way for pipe lines, granted by J. B. Reynolds and wife to the Carbide and Carbon Chemicals Corporation, dated March 18, 1927, recorded in said Clerk's office in Deed Book No. 323 at page 208.

[fol. 992] (d) A right of way for pipe lines granted by J. B. Reynolds and wife to the Carbide and Carbon Chemicals Corporation, dated June 8, 1929, recorded in said Clerk's office in Deed Book No. 349 at page 360.

The said party of the first part covenants to and with the party of the second part that he will warrant generally the property hereby conveyed, subject only to the rights of way heretofore mentioned; that he has the right to convey said land to the grantee; that the grantee shall have quiet possession of the said land; that the said land is free and clear of all liens and encumbrances; save and except the aforesaid rights of way; that he has done no other act or acts to encumber the said land and that he

will execute such further assurances of said land as may be requisite to assure the said land and premies hereby conveyed, or intended so to do unto the United States of America, its successors and assigns.

Witness, the following signature and seal:

J. B. Reynolds, Widower. (Seal.)

[fols. 993-1032] STATE OF WEST VIRGINIA,

County of Kanawha, ss:

I, Elsa B. Hapney, a Notary Public for said county, do certify that J. B. Reynolds, widower, whose name is signed to the writing above, bearing date on the 25th day of September, 1933, has this day acknowledged the same before me, in my said County of Kanawha.

My commission expires on the 24th day of October, 1940.

Given under my hand this 27th day of September, 1933.

Elsa B. Hapney, Notary Public. (Notarial Seal.)

West Va. Kanawha County Court Clerk's Office, October 3, 1933. This Deed was this day presented to me in my office, and thereupon, together with the Certificate thereto annexed, is admitted to record.

Teste. J. M. Slack, Clerk, Kanawha County Court.

Stamps $4.50 affixed to original Deed, June 22, 1934. (W. B. Brooks, D. C.).

(Deed Book 390, page 55, etc.)

[fol. 1033] IN UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA

In Equity. No. 3492.

THE DRAVO CONTRACTING COMPANY, a Corporation, Plaintiff,

versus

FRED L. FOX, State Tax Commissioner of West Virginia, Defendant

(Argued at Charleston, West Virginia on September 11, 1936. Decided October 1, 1936)

Before Northcutt, Circuit Judge, and Watkins and McClintic, District Judges

William S. Moorhead, of Pittsburgh, Pennsylvania, and W. Chapman Revercomb, of Charleston, West Virginia

(Moorhead & Knox, Koontz, Hurlburt & Revercomb, Lawrence D. Blair and W. Elliott Nefflen on brief) for Plaintiff, and Homer A. Holt, Attorney General of West Virginia, (W. Holt Wooddell, Assistant Attorney General, of Charleston, West Virginia, on brief) for Defendant.

Findings of Fact, Conclusions of Law and Opinion

The Court makes the following findings of fact and conclusions of law:

FINDINGS OF FACT

There is no dispute as to the fact as they were stipulated. The stipulation shows the following material facts:

The plaintiff (Dravo Contracting Company, is a Pennsylvania corporation, created under the laws of that State, with its principal office and factories in Pittsburgh, Pennsylvania. It is engaged in the general contracting business and is admitted to do business as a foreign corporation in the State of West Virginia.

During the years 1932 and 1933 the plaintiff entered into four written contracts with the United States of America [fol. 1034] agreeing to construct locks and dams in the Kanawha River and locks in the Ohio River, both navigable streams. These locks and dams are constructed at or near points on said rivers known as Marmet, London and Winfield, West Virginia, on the Kanawha River, and near Gallipolis, Ohio, on the Ohio River, within the exterior boundaries of the State of West Virginia, and were being constructed primarily in the aid of navigation.

These contracts were entered into in the following manner; the United States gave notice of a proposed work and invited bids. The notice and invitations were mailed from Huntington, West Virginia, and received by the plaintiff at its office in Pittsburgh, Pennsylvania. The plaintiff prepared its bid, together with the required bid bond, at its office in Pittsburgh and conveyed same by special messenger to the office of the United States Engineer at Huntington, West Virginia. On the acceptance of the plaintiff's bid on the four projects, written contracts and performance bonds were prepared by the United States and forwarded by mail from Huntington, West Virginia, to the plaintiff at Pittsburgh, at which latter point the plaintiff executed said contracts and bonds and forwarded same by mail to the

office of the United States Engineer at Huntington, West Virginia. In each instance the performance bonds were approved by the Judge Advocate General of the War Department of the United States Government, at Washington, D. C.

Payments of the amount received by the plaintiff under the several contracts were made monthly, or semi-monthly, by checks drawn by a disbursing officer of the War Department of the United States, at Huntington, West Virginia, on the United States Treasury and were delivered by mail from Huntington, West Virginia, to the office of the plaintiff at Pittsburgh, Pennsylvania. These payments were based upon estimates made by representatives of the United States for materials delivered to, and for materials fabricated during the particular month by the plaintiff at its Neville Island Shops at Pittsburgh, Pennsylvania, for use in said locks and dams as provided by the respective contracts and estimates made from time to time as the locks and dams were erected. A retained percentage of ten per cent (10%) on each estimate was paid upon the final accept-
[fol. 1035] ance of the completed work.

During the years 1933 and 1934 plaintiff completed the performance of its contracts pertaining to the locks and dams at Marmet and London and completed performance of its contract at Winfield in February, 1935. The locks at Gallipolis have been partially completed and the plaintiff is now engaged in the further performance of that contract. For the work so performed during the years 1933 and 1934 plaintiff received the gross sum of $6,634,462.29.

Certain parts of the locks and dams built by the plaintiff were fabricated at its shops at Neville Island, Pittsburgh, and moved to the various locations by the plaintiff. Partial payments were made by the Government to the plaintiff on some of these parts so fabricated before they were moved from plaintiff's plant. Certain materials were purchased outside the State of West Virginia and shipped to the plaintiff's plant at Pittsburgh. Part of the labor employed was hired at each of the respective sites of construction, and certain expert workmen and foremen were sent from outside into the state.

The estimates of cost and the bids based thereon did not include, and there was not included, in the contract price paid to the plaintiff by the United States, any specified item

to cover the West Virginia Gross Income Tax. The plaintiff, however, at the time of making such estimates and bids knew of the Gross Sales and Income Tax Law of West Virginia.

The United States, with the consent of the State of West Virginia, acquired, by purchase or condemnation, the land on both sides of the navigable streams upon which said locks and dams were constructed. In addition to the land owned by the United States the plaintiff leased from private owners near the Marmet lock and dam two lots which were occupied and used from time to time for storing materials and machinery, and the plaintiff used a roadway across one of the lots so leased. Plaintiff leased one acre of land from private owners near the Winfield lock during the construction and used same to store materials. Plaintiff also leased two acres of land from a private owner in West Virginia near the Gallipolis locks and used same to store mate- [fol. 1036] rials and for the erection of temporary small buildings.

The United States constructed said locks and dams primarily for the development and improvement of navigation, incidentally aiding in the control of floods in said rivers. The dams were so designed and constructed as to permit the United States to use or license the use of water power thereby created for generation of electricity and the United States has granted to a private corporation a license to use the water power resulting from the damming of the river at Marmet and at London. This license provides that nothing can be done to interfere with navigation.

The statutes of the State of West Virginia consenting to the acquisition of lands by the United States are found in Article I, Chapter I, of the Code of West Virginia.

In the years 1933 and 1934 the plaintiff performed work in the State of West Virginia for persons other than the United States Government and made returns and paid taxes upon the gross income from such work and, in the same years, paid ad valorem property taxes to the State of West Virginia, and its political subdivisions, on its personnel property in the aggregate amount of $5,790.62. The plaintiff has also paid the state the tax required of a foreign corporation for doing business in the state. The tax here involved is an additional charge.

The defendant is the duly qualified and acting State Tax Commissioner of the State of West Virginia, charged with

the duty of enforcing the taxing statutes of the State of West Virginia and empowered to collect the taxes here involved. The defendant has his office in the City of Charleston in the southern district of West Virginia, and is domiciled and is a resident in the southern judicial district of said state.

The defendant has made an assessment against the plaintiff for the calendar years 1933 and 1934 in the sum of $135,761.51, taxes and penalties, exclusive of interest, upon the gross amounts received by the plaintiff during said years from the United States Government under the contracts above mentioned. The defendant has notified the [fol. 1037] plaintiff of said assessment, and has also notified it that unless said amount so claimed is paid immediately, that the defendant would be forced to proceed in accordance with the law to collect the same and to distrain on the property of the plaintiff.

The assessment so made by the defendant against the plaintiff was under the provisions of the Gross Sales and Income Tax Law of West Virginia, Article 13, Chapter 11, Code of West Virginia, 1931, and as amended, effective May 26, 1933, for the years 1933 and 1934. Said law makes no provision for payment under protest and recovery back by the taxpayer and it was admitted in the pleadings and the argument that the plaintiff had no adequate remedy at law if its contention that the tax is not collectible is sustained. The tax sought to be imposed was two per cent. (2%) of the gross amount received by the plaintiff under the contracts.

A distraint by the defendant upon the plaintiff's property, at present used in plaintiff's work under the contracts, would stop said work or materially interfere therewith.

The necessary amount to give this court jurisdiction is involved.

A temporary restraining order has been issued pending the hearing, and it was agreed at the hearing that the cause should be finally submitted for determination as to whether the permanent injunction should be issued.

Conclusions of Law

The court concludes that there is involved in this suit the necessary amount to give the District Court of the United States for the Southern District of West Virginia jurisdiction of the cause.

That the plaintiff has no adequate remedy at law and that a court of equity has jurisdiction of the issue.

That the United States Government in the erection and construction of the locks and dams was engaged in a project for which it had full authority under the Constitution of the United States and was in the exercise of a proper function for the improvement of navigable rivers.

That the imposition of the tax here involved constitutes a direct burden upon a lawful and proper project of the United States Government and that the State of West Vir- [fol. 1038] ginia has no power to impose upon and collect from the plaintiff this tax.

That the plaintiff is entitled to the relief prayed for.

OPINION

NORTHCOTT, Circuit Judge:

This is a suit in equity, brought by the plaintiff, seeking to restrain the collection of certain taxes sought to be imposed by the State of West Virginia. A district court of three judges, organized in accordance with section 266 of the Judicial Code (28 U. S. C. A. section 380), heard the case on complainant's application for interlocutory and permanent relief. At the hearing no evidence was taken, the cause was submitted on a stipulation of facts, and it was agreed that the hearing should be final.

The tax sought to be imposed upon the plaintiff in a Gross Sales and Income Tax and the rate of the tax is two per cent (2%). For the purposes to be considered here there is a very distinct difference between a tax upon gross income and a net income tax. This point was discussed in the case of United States Glue Company, vs. Town of Oak Creek, 247 U. S. 321, where the court said:

"The difference in effect between a tax measured by gross receipts and one measured by net income, recognized by our decisions, is manifest and substantial, and it affords a convenient and workable basis of distinction between a direct and immediate burden upon the business affected and a charge that is only indirect and incidental. A tax upon gross receipts affects each transaction in proportion to its magnitude, and irrespective of whether it is profitable or otherwise. Conceivably it may be sufficient to make the difference between profit and loss, or to so diminish the

profit as to impede or discourage the conduct of the commerce. A tax upon the net profits has not the same deterrent effect, since it does not arise at all unless a gain is shown over and above expenses and losses, and the tax cannot be heavy unless the profits are large."

If the State of West Virginia is held to have the right to impose the tax here involved every contractor submitting bids on any Government project would necessarily have to add the amount of the gross tax to his estimate of the cost of doing the work. Such a tax would have to be paid whether there was any profit in the contract or not, and it seems clear that such a tax is a direct burden upon any improvement of this character and therefore a burden upon the United States in carrying out any projected proper public improvement.

In the judicial history of the United States it was early [fol. 1039] settled by the Supreme Court, in the case of M'Culloch vs. The State of Maryland et al., 4 Wheat. 316, that a state may not tax the operations carried on by the United States in the proper execution of constitutional powers vested in it. In that case Mr. Chief Justice Marshall said:

"The court has bestowed on this subject its most deliberate consideration. The result is a conviction that the states have no power, by taxation or otherwise, to retard, impede, burden, or in any manner control the operations of the constitutional laws enacted by Congress to carry into execution the powers vested in the general government. This is, we think, the unavoidable consequence of that supremacy which the constitution has declared."

This principle has stood in all the years following Chief Justice Marshall's decision.

In the case of The Union Pacific Railroad Company vs. William S. Peniston, 18 Wall. 5, the court said:

"It is, therefore, manifest that exemption of federal agencies from state taxation is dependent, not upon the nature of the agents, or upon the mode of their constitution, or upon the fact that they are agents, but upon the effect of the tax; that is, upon the question whether the tax does in truth deprive them of power to serve the government as they were intended to serve it, or does hinder the efficient

exercise of their power. A tax upon their property has no such necessary effect. It leaves them free to discharge the duties they have undertaken to perform. A tax upon their operations is a direct obstruction to the exercise of federal powers."

Even in the dissenting opinion of Mr. Justice Bradley, in that case, he says:

"* * *. In that case the contract is the means employed for carrying into execution the powers of the government, and the contract alone, and not the contractor, is exempt from taxation or other interference by the State government."

In Weston vs. City Council of Charleston, 2 Peters 449, the court said:

"The tax in question is a tax upon the contract subsisting between the government and the individual. It bears directly upon that contract, while subsisting and in full force. The power operates upon the contract the instant it is framed, and must imply a right to affect that contract."

* * * * * * *

"The right to tax the contract to any extent, when made, must operate upon the power to borrow before it is exercised, and have a sensible influence on the contract. The extent of this influence depends on the will of a distinct government. To any extent, however inconsiderable, it is a burden on the operations of government. It may be carried to an extent which shall arrest them entirely."

[fol. 1040] See, also:

Choctaw, Oklahoma & Gulf Railroad Company vs. Harrison, 235 U. S. 292.

Indian Territory Illuminating Oil Company vs. State of Oklahoma, 240 U. S. 522.

Panhandle Oil Company vs. Mississippi ex rel. Knox, 277 U. S. 218.

Trinityfarm Construction Company vs. Grosjean, 291 U. S. 466.

Indian Motocycle Company vs. United States, 283 U. S. 570.

The decisions are unanimous in holding that sales to the federal government are not subject to a tax by a state.

We are of the opinion that the tax here sought to be collected from the plaintiff is a direct burden upon the United States in contracting with the plaintiff rather than a tax upon the income of the contractor.

The United States in the construction of the locks and dams in question is engaged in the proper, lawful and meritorious policy of aiding navigation. The right of the federal government to do this under the constitution cannot be doubted. Such a tax would be a direct burden upon a proper activity of the federal government. The limit of such a tax would lie within the discretion of the State Legislature, and it could be fixed at such an amount as would not only impede but prevent the carrying out of projects of this character. In these days when vast projects are being carried on all over the country by the United States it can readily be seen that the imposition, by all the states, of a tax of this character would amount to a vast sum and become a great burden upon the national government.

With the wisdom of a policy that would cause a state to seek to gain revenue from vast projects within its boundaries, projects that give employment to the citizens of that state, to gain revenue for the state, we are not concerned; we only have to deal with the question whether the state can so hamper legitimate activities of the United States. We do not think it can.

The defendant relies upon two cases to support its contention that the tax is lawful. The case of General Con-
[fol. 1041] struction Company v. Fisher et al., 149 Ore. 84, (appeal dismissed for want of a substantial federal question, 295 U. S. 715) and the case of Ralph Sollitt & Sons Construction Company v. Commonwealth, 161 Va. 854, (appeal dismissed for the want of a substantial federal question, 292 U. S. 599), but in neither of these cases was a gross tax involved. In the Oregon case an excise tax for the privilege of doing business within the state was involved and the tax was measured by net income, here the tax is measured by gross income. In that case money was advanced by the United States to carry out a reclamation project under the Department of Interior and this money was to be

re-paid as the reclaimed land was sold. In the Virginia case a license tax to do business as a foreign corporation was involved and not a gross tax. The plaintiff had paid a license tax to the State of West Virginia, as well as a direct property tax. This gross tax here sought to be collected is in addition to the taxes already paid by the plaintiff. We do not think that the decisions in these two cases are controlling of the issue here involved.

The case of Baltimore Shipbuilding & Dry Dock Company v. Mayor and City Council of Baltimore, 195 U. S. 375, also relied upon by the defendant, is not in point. In that case a land tax was involved and the court held that only the dock company's interest in the land was taxed; that the United States had no present right in rem; and the interest of the United States in the land was a condition subsequent.

It is also contended on behalf of the defendant that the fact that the dams were so constructed as to permit the use of the water power thus created to be used for the generation of electricity, by parties other than the Government, justified the tax—we do not think so. Under the holding of the Supreme Court in the Tennessee Valley cases, 80 L. Ed. 427, the Government having the right to erect the dam in the first place for a legitimate purpose has the right to make incidental use of the water power for the purpose of generating electricity and has the right to sell or lease the same.

It is further contended on behalf of the defendant that the fact that the contractor in some instances leased land adjoining the Government land upon which the locks and dams were constructed justified the tax. This would unquestionably be true under the Virginia case above dis- [fol. 1042] cussed, where the question involved is one of a tax upon the contractor. Here we reach the conclusion that the tax is upon the contract and therefore upon the United States and not upon the contractor. A number of other points have been raised both on behalf of the plaintiff and the defendant but, in view of our conclusion as above set out, we do not think it necessary to discuss them.

For the reasons above given the injunction prayed for will be awarded.

Elliott Northcott, U. S. Circuit Judge. H. H. Watkins, U. S. District Judge. Geo. W. McClintic, U. S. District Judge.

[fol. 1043] IN UNITED STATES DISTRICT COURT

In Equity. No. 3492

THE DRAVO CONTRACTING COMPANY, a Corporation, etc., Plaintiff,

versus

FRED L. FOX, etc., Defendant

DECREE—October 24, 1936

The Court, having maturely considered the issues arising upon the pleadings, orders, stipulation, and all the proceedings heretofore had in this cause, as fully set out in the order of submission entered herein on September 11, 1936, and the arguments of counsel thereon, is of the opinion, for reasons stated in its separate findings of fact and its written opinion containing its conclusions of law hereinafter referred to, that the plaintiff is entitled to the relief prayed for in its said bill of complaint.

Now, therefore, upon consideration whereof, and on motion of the attorneys for the plaintiff, it is

Adjudged, Ordered and Decreed, as follows, viz:

That the assessment of Gross Sales and Income Taxes and penalties for the years 1933 and 1934, in the sum of $135,761.51, made by Fred L. Fox, State Tax Commissioner of West Virginia, defendant, against The Dravo Contracting Company, plaintiff, is invalid and void, and that the defendant, Fred L. Fox, individually and as State Tax Commissioner of the State of West Virginia, his assistants, agents, officers, servants, employees and attorneys, and each and every one of them, be, and they are hereby, permanently enjoined, inhibited and restrained, as follows:

First. From proceeding further and from making any levy upon any property of the plaintiff located within the State of West Virginia, and from interfering with the plaintiff, and its rights, in any manner whatsoever, by reason of any assessment by the said defendant, Fred L. Fox, as [fol. 1044] State Tax Commissioner aforesaid, under the law of the State of West Virginia, commonly known as the "Gross Sales and Income Tax Law," incorporated in Article 13, Chapter 11, of the Code of West Virginia of 1931, and as amended by Chapter 33, Acts of the Legislature of West Virginia at its First Extraordinary Session

for the years 1933, effective May 27, 1933, upon the gross receipts of money received by the plaintiff during the years 1933 and 1934, respectively, from the United States of America, under and by virtue of four certain written contracts between the plaintiff and the United States of America, pertaining to a dam near Marmet West Virginia, a dam near London, West Virginia, twin locks near Winfield, West Virginia, in the Kanawha River, and parallel locks near Gallipolis, Ohio, in the Ohio River; and

Second. From attempting under and by virtue of the law of West Virginia, commonly known as the "Gross Sales and Income Tax Law," as aforesaid, to collect from plaintiff in any manner any sum as a tax upon the gross receipts of money received by the plaintiff during the years 1933 and 1934, respectively, from the United States of America by reason of the contracts aforesaid.

The opinion prepared in this cause by Judge Northcott is concurred in by Judges Watkins and McClintic; and said opinion is ordered filed as part of the record herein, together with a statement of the findings of facts made by the Court, which is concurred in by all of the Judges.

It is further adjudged, ordered and decreed that the plaintiff do recover from the defendant its costs of this suit to be taxed by the Clerk.

Elliott Northcott, Judge of the United States Circuit Court of Appeals for the Fourth Circuit. H. H. Watkins, Judge of the United States District Court for the Western District of South Carolina. Geo. W. McClintic, Judge of the United States District Court for the Southern District of West Virginia.

Approved as to form: W. Chapman Revercomb, for the plaintiff, H. A. Holt, Attorney General.

[fol. 1045] In United States District Court

[Title omitted]

Order Allowing Appeal—November 16, 1936

This cause coming on further to be heard upon the petition of Fred L. Fox, in his individual right and in his official capacity as State Tax Commissioner of the State of West Virginia, the defendant, for the allowance of an appeal to the Supreme Court of the United States, in which petition

said defendant prays that the permanent injunction granted by the final decree be suspended during the pendency of the appeal and that the amount of security for supersedeas and cost bond to be executed by him be fixed.

[fol. 1046] And it appearing to the Court that such suspension should be granted only upon the giving of an adequate bond which will fully protect the plaintiff in the event that the final decree of said court is affirmed.

It Is Ordered that the appeal prayed for is granted; that the permanent injunction is suspended during the pendency of this appeal, upon the condition that the said defendant, Fred L. Fox, make and file a supersedeas and cost bond with good and sufficient surety in the sum of Five Thousand Dollars ($5,000.00), conditioned as required by law.

That the Clerk of this Court transmit to the Supreme Court of the United States in the manner provided by law a transcript of such parts of the record and proceedings herein, duly authenticated, as the parties, defendant and plaintiff, may by præcipe duly designate.

That a citation be issued admonishing the plaintiff to be and appear in the Supreme Court of the United States on or before the 26th day of December, 1936.

Whereupon came the said Fred L. Fox, defendant as aforesaid, and tendered a cost and supersedeas bond executed by him as principal and by The Fidelity & Casualty Company of New York, a corporation, as surety, in the amount of Five Thousand Dollars ($5,000.00), and conditioned according to law and in accordance with the provisions of this order, which bond, having been inspected by the [fol. 1047] Court, is approved and ordered filed.

Elliott Northcott, Judge of the United States Circuit Court of Appeals for the Fourth Circuit. Geo. W. McClintic, Judge of the District Court of the United States for the Southern District of West Virginia. H. H. Watkins, Judge of the District Court of the United States for the Western District of South Carolina.

The undersigned counsel of record for the Appellee hereby acknowledge service of a copy of the above order allowing appeal, this 16th day of November, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Appellee.

[fol. 1048] IN UNITED STATES DISTRICT COURT

[Title omitted]

PETITION FOR ALLOWANCE OF APPEAL—Filed November 16, 1936

To the Honorable Elliott Northcott, Judge of the United States Circuit Court for the Fourth Circuit; the Honorable George W. McClintic, Judge of the District Court of the United States for the Southern District of West Virginia; and the Honorable H. H. Watkins, Judge of the District Court of the United States for the Western District of South Carolina, composing the statutory court under the provisions of Section 266, amended, of the Judicial Code:

[fol. 1049] Now comes the defendant, Fred L. Fox, in his individual right and in his official capacity as State Tax Commissioner of the State of West Virginia, and considering himself aggrieved by the decree entered on the 24th day of October, 1936, in the above-entitled cause, awarding a permanent injunction as prayed for in the complainant's bill of complaint, does hereby appeal therefrom to the Supreme Court of the United States for reasons specified in the assignment of errors, which is filed herewith, and prays:

1. That this appeal be allowed;

2. That a citation be issued to the above-named plaintiff, The Dravo Contracting Company, a corporation organized and existing under the laws of the State of Pennsylvania, as provided by law;

3. That an order of supersedeas be entered herein pending the final disposition of the cause, and that the amount of surety for supersedeas and cost bond be fixed by order allowing the appeal;

4. That a transcript of the record, proceedings and papers upon which said decree was predicated, duly authenticated, be sent to the Supreme Court of the United States, together with the typewritten statement of the defendant disclosing the basis upon which it is contended that the Supreme Court of the United States has jurisdiction to review the decree, and his præcipe indicating the portions of the

record to be incorporated in the transcript, which præcipe and statement are filed herewith.

Fred L. Fox, In His Individual Right and in His Official Capacity as State Tax Commissioner of the State of West Virginia, by Homer A. Holt, Attor-
[fol. 1050] ney General of West Virginia, and W. Holt Wooddell, Assistant Attorney General of West Virginia, His Counsel.

The undersigned counsel of record for the plaintiff hereby acknowledge service of a copy of the foregoing petition for appeal.

Dated at Charleston, West Virginia, this 16th day of November, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Plaintiff.

[fol. 1051] In United States District Court

[Title omitted]

Notice of Appeal—Filed November 16, 1936

To Messrs. William S. Moorhead, W. Chapman Revercomb, and W. Elliott Nefflen, Attorneys for the Plaintiff in the Above-styled Cause:

Please take notice that the defendant in the above-styled cause, feeling aggrieved by the decree entered therein on the 24th day of October, 1936, will, on the 16th day of November, 1936, or as soon thereafter as his counsel may be heard, present to the Court his petition praying for the [fol. 1052] allowance of an appeal to the Supreme Court of the United States, and for the entry of an order of supersedeas staying the execution of said decree pending the final disposition of this cause and fixing the amount of security to be given, accompanied with his "Assignment of Errors" and his "Statement on Behalf of Defendant as to Jurisdiction of the Supreme Court of the United States to Review Decree upon Appeal," a copy of each of which said papers is attached hereto.

Homer A. Holt, Attorney General of West Virginia, Counsel for Defendant.

Service of a copy of the above and foregoing notice acknowledged this 12th day of November, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Attorneys for Plaintiff.

[fol. 1053] IN UNITED STATES DISTRICT COURT

[Title omitted]

ASSIGNMENT OF ERRORS—Filed November 16, 1936

Comes now Fred L. Fox, in his individual right and in his official capacity as State Tax Commissioner of the State of West Virginia, the defendant in the above-styled cause, by his counsel and says that there are manifest errors in the record, proceedings and final decree in said cause, upon which he will rely upon his appeal from the decree entered on the 24th day of October, 1936, and, for the purpose of having the cause reviewed in the Supreme Court of the United States, makes the following assignment of errors, to-wit:

[fol. 1054] 1. The court erred in holding, as a conclusion of law, that the imposition of the West Virginia Gross Sales and Gross Income Tax (Section 2 (e), Article 13, Chapter 33, Acts of the Legislature of West Virginia, First Extraordinary Session, 1933, amending Article 13, Chapter 11, Official Code of West Virginia, 1931) against the plaintiff with respect to gross income received from the United States by the plaintiff as an independent contractor with the United States for the construction of certain locks and dams, primarily in aid of navigation, on navigable waters within the territorial limits of West Virginia, constitutes a direct burden upon a lawful undertaking of the United States, and that the State of West Virginia has no power to impose upon and collect from the plaintiff such tax.

2. The court erred in awarding the permanent injunction prayed for in the bill of complaint.

Wherefore, the defendant, Fred L. Fox, in his individual right and in his official capacity as State Tax Commissioner of the State of West Virginia, prays that the decree of the District Court of the United States for the Southern Dis-

trict of West Virginia be reversed, and that the injunction granted by said court be dissolved, and a judgment entered in accordance with the rights of the defendant.

Homer A. Holt, Attorney General of West Virginia; W. Holt Wooddell, Assistant Attorney General of West Virginia, Counsel for Defendant.

[fols. 1055-1067] The undersigned, counsel of record for the plaintiff, hereby acknowledge service of a copy of the foregoing assignment of errors.

Dated at Charleston, West Virginia, this 16th day of November, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Plaintiff.

[fols. 1068-1071] Supersedeas and cost Bond on Appeal for $5,000.00, approved and filed November 16, 1936, omitted in printing.

[fols. 1072-1074] Citation, in usual form, showing service on Wm. S. Moorhead et al., omitted in printing.

[fol. 1075] IN UNITED STATES DISTRICT COURT

[Title omitted]

PRÆCIPE FOR TRANSCRIPT OF RECORD—Filed November 16, 1936

To the Clerk of the District Court of the United States for the Southern District of West Virginia:

You will please prepare a transcript of the record to be transmitted to the Supreme Court of the United States, in pursuance of the appeal heretofore allowed in this cause, and include therein the following:

The bill of complaint of the plaintiff, with Exhibits 1 to 8, inclusive, filed therewith;

Notice of motion for temporary restraining order and interlocutory injunction;

Application for interlocutory injunction;

[fol. 1076] Motion for temporary restraining order;

Order granting temporary restraining order, filing motion for interlocutory injunction, and continuing action thereon;

Answer of the defendant;

Order filing answer;

Notice to H. G. Kump, Governor, Homer A. Holt, Attorney General, and Fred L. Fox, State Tax Commissioner, of hearing on application for interlocutory injunction;

Statement of facts entered into between the plaintiff and the defendant in lieu of the formal taking of evidence, together with appendices Nos. "A" to "P", inclusive, including Nos. "C-1", "D-1", "E-1", and "E-2";

Order filing stipulation and appendices and submitting case for decision;

Final decree awarding a permanent injunction;

Opinion of court and findings of fact and conclusions of law;

Notice of application for appeal and acknowledgment of service thereon;

The petition for appeal to the Supreme Court of the United States and acknowledgment of service thereon;

Assignment of errors accompanying petition for appeal and prayer for reversal contained therein, and acknowledgment of service thereon;

Statement of defendant (appellant) disclosing basis upon which it is contended that the Supreme Court of the United States has jurisdiction upon appeal to review the decree in question, and acknowledgment of service thereon;

[fol. 1077] Notice to plaintiff (appellee) calling attention to provisions of Paragraph 3, Rule 12, Rules of the Supreme Court with acknowledgment of service thereon;

Order allowing the appeal, granting a supersedeas, and approving the costs and supersedeas bond, with acknowledgment of service thereon;

Cost and supersedeas bond, with approval of the court endorsed thereon;

Citation with acknowledgment of service thereon;

All orders of the court filing pleadings or otherwise made with reference to the cause, not specifically mentioned herein;

This præcipe, with acknowledgment of service upon and approval of by counsel of record for plaintiff (appellee) endorsed thereon.

Please certify the same to the Supreme Court of the United States under your seal and in accordance with the rules of said Court and with the laws of the United States relating to such appeals.

Homer A. Holt, Attorney General of West Virginia; W. Holt Wooddell, Assistant Attorney General of West Virginia, Counsel for Appellant.

Dated this 16th day of November, 1936.

[fols. 1078-1080] The undersigned attorneys of record for the Appellee in the above-entitled cause, hereby acknowledge service of the above Præcipe, and approve the same, this 16th day of November, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Attorneys for Appellee.

[fol. 1081] In United States District Court

[Title omitted]

Order Filing Amended Statement as to Jurisdiction, etc. —December 16, 1936

This day came the respective parties by their counsel and the defendant (appellant) tendered and asked leave to file his amended statement on behalf of defendant as to jurisdiction of the Supreme Court of the United States to review decree upon appeal and the defendant (appellant) in open court agreed that the plaintiff (appellee) may file with the clerk of the court possessed of the record, within fifteen days after the date of service upon the said plaintiff (appellee) of a copy of this order and a copy of said amended statement, the statement provided for by Paragraph 3 of Rule 12 Rules of the Supreme Court; and it appearing that the clerk of this court is yet possessed of the record, leave is granted the defendant (appellant) to file said amended statement and to amend his præcipe so as to direct the clerk to incorporate said amended statement into the transcript of the record.

The plaintiff (appellee) objected to the filing of said amended statement as to jurisdiction.

Geo. W. McClintic, Judge of the District Court of the United States for the Southern District of West Virginia.

The undersigned counsel of record for the plaintiff (appellee) hereby acknowledge service of a copy of the above order filing amended statement as to jurisdiction, this 16th [fols. 1082-1108] day of December, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Plaintiff (Appellee).

[fol. 1109] In United States District Court

[Title omitted]

Supplemental Præcipe for Transcript of Record—Filed December 16, 1936

To the Clerk of the District Court of the United States for the Southern District of West Virginia:

In preparing the transcript of the record to be transmitted to the Supreme Court of the United States in pursuance of the appeal heretofore allowed in this cause and in addition to the items and papers mentioned in the præcipe filed on the 16th day of November, 1936, you will please include in said transcript Amended Statement on Behalf of Defendant (appellant) as to Jurisdiction of the Supreme [fol. 1110] Court of the United States to Review Decree Upon Appeal with acknowledgment of service thereon, Order of the District Court Permitting the Filing of said Amended Statement with acknowledgment of service thereon, Notice to Plaintiff (Appellee) that said amended statement would be filed with acknowledgment of service thereon, and this Supplemental Præcipe with acknowledgment of service thereon.

Homer A. Holt, Attorney General of West Virginia; W. Holt Wooddell, Assistant Attorney General of West Virginia, Counsel for Defendant (Appellant).

Dated this 16th day of December, 1936.

The undersigned attorneys of record for the plaintiff (appellee) in the above-entitled cause, hereby acknowledge service of the above Supplemental Præcipe, this 16th day of December, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Attorneys for Plaintiff (Appellee).

[fols. 1111-1112] Clerk's certificate to foregoing transcript omitted in printing.

[fol. 1113] In Supreme Court of the United States

Statement of Points to Be Relied Upon—Filed January 6, 1937

Comes now the appellant in the above-entitled cause and states that the points upon which he intends to rely in this Honorable Court in this case are as follows:

[fol. 1114]

Point I

Appellee was an independent contractor with the United States and not an instrumentality thereof and is not exempt from non-discriminatory state taxation.

Point II

The several constructions of the locks and dams were purely local undertakings and did not constitute the carrying on of interstate commerce. The acquisition of materials without the State of West Virginia and the transportation of the same into the State of West Virginia, and the fabrication of certain metal parts of the locks and dams without West Virginia, and the transportation of the same into West Virginia, were purely incidental to the local performance of the construction contracts within the State of West Virginia.

Point III

The contracts were not performed exclusively upon land purchased or condemned by the United States for the construction of needful buildings and within the exclusive jurisdiction of the United States, but a major part of the construction was upon and within the river beds as to which no claim was made that the same were acquired by the United States by purchase, condemnation, or otherwise.

Point IV

The imposition of the tax here involved against the plaintiff, an independent contractor for gain with the United States, does not constitute a direct burden upon the operations of the United States.

[fols. 1115-1116] Point V

Should the Court be of opinion that the performance of any part of these contracts was without the State of West Virginia or constituted the carrying on of interstate commerce, the tax is clearly of the character to be applicable to the performance of so much of the contracts as constituted the doing of local business within the State of West Virginia.

And the appellant further adopts and will rely upon the assignments of error filed with his petition for appeal on November 16, 1936.

Dated this the 24th day of December, 1936.

Homer A. Holt, Attorney General of West Virginia; W. Holt Wooddell, Assistant Attorney General of West Virginia, Counsel for Appellant.

Service of a copy of the foregoing statement of points is hereby acknowledged on behalf of the appellee, this the 24th day of December, 1936.

William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Appellee.

[fol. 1117] In Supreme Court of the United States

Stipulation of Parts of Record Necessary for Consideration of Case—Filed January 6, 1937

Appellant and Appellee agree that in their opinion the entire record as filed is necessary for the consideration of the case and needs to be printed by the clerk for the hearing thereof Except:

Exhibits 3, 5, and 6, filed with the plaintiff's bill may be omitted and there be printed in lieu thereof the thirteen pages appended hereto and designated "Appendix X."

[fol. 1118] Exhibit 7. with the plaintiff's bill may be omitted.

Of Exhibit 8 filed with the plaintiff's bill there may be omitted all pages and paragraphs designated for deletion by Stipulation of Counsel appended hereto and designated "Appendix Y;" and said stipulation shall be printed.

Of Appendix B to Stipulation of Facts it is agreed that for all material purposes hereof the invitation and bid relating to the London contract are typical of the invitations and bids for all contracts and shall be printed. The invitation and bids relating to the Marmet, Winfield, and Gallipolis contracts may be omitted.

Appendices C, C-1, D, D-1, E, and E-2 with the Stipulation of Facts may be omitted.

Appendix F to the Stipulation of Facts may be omitted and in lieu thereof there shall be printed the stipulation of counsel with respect thereto hereto appended and designated as "Appendix Z."

All exhibits with the plaintiff's bill and parts thereof omitted, and all appendices to the Stipulation of Facts and parts thereof omitted, shall be available for use by the Court and by counsel, with the right of either party to supply so many copies thereof as may be requested or required by the Court.

Dated this the 24th day of December, 1936.

Homer A. Holt, W. Holt Wooddell, Counsel for Appellant. William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott [fol. 1119] Nefflen, Counsel for Appellee.

[fol. 1120] APPENDIX "X" TO STIPULATION OF PARTS OF RECORD NECESSARY FOR CONSIDERATION OF CASE

[fol. 1121] The Marmet Contract dated November 28th, 1932, for the estimated amount of $876,375.70, is the same in all material respects as the foregoing London contract with the exception of the following notations:

Page (2) of the Contract

"This Contract, entered into this thirtieth day of August, 1932, by The United States of America, hereinafter called the Government, represented by the contracting officer executing this contract, and The Dravo Contracting Company, a corporation organized and existing under the laws of the State of Pennsylvania, of the City of Pittsburgh in the State of Pennsylvania hereinafter called the contractor,

witnesseth that the parties hereto do mutually agree as follows:

"Article 1. *Statement of work.*—The contractor shall furnish all labor and materials, and perform all work required for constructing a roller-gate dam and the installation of a permanent upper lock gate at the Marmet Lock and dam, Kanawha River for the consideration of the sum based on designations and unit rates specified in schedule appended hereto."

Page 1-2—General Specifications

"War Department

"Maintenance and Improvement of Existing River and Harbor Works (Great Kanawha River, W. Va., Lock and Dam Construction)

"Specifications for Constructing a Roller-Gate Dam and Installation of a Permanent Lock Gate, Marmet Lock and Dam, Great Kanawha River

"General Specifications

"1. *Location.*—The site of the work contemplated herein [fol. 1122] is in the Great Kanawha River near the town of Marmet, W. Va., about nine miles above the City of Charleston, W. Va., and sixty-eight miles above the mouth of the river.

"2. *Work to be done.*—(a) The work provided for herein is authorized by the River and Harbor Act approved July 3, 1930.

"(b) The work to be done under these specifications will consist of furnishing all plant, labor and material for, and constructing the following:

"(1) *Roller-Gate Dam with Service Bridge and Emergency Bulkhead.*—The dam will consist of five steel, roller gates closing on concrete sills between concrete piers and individually operated by electric hoists housed on the tops of the piers. (See Pars. 5-01 & 5-04.)

"The steel service bridge will be of the deck-truss type approximately 565 feet in length, and shall be provided with a revolving crane operating on the top chords and a bridge-

crane unit on the bottom chords. (See pars. 5-02, 5-06 and 5-07.)

"The emergency bulkhead will consist of seven steel-truss units, each approximately 104 feet long. (See par. 5-03.)

"(2) *Upper Miter-Gate and Turbine-Intake Bulkhead for Lock "A".*—The temporary gate now in place shall be removed and placed on a barge to be furnished by the contracting officer, a foundation for the emergency dam constructed, the concrete sills raised, and a new, permanent gate furnished and installed. (See par. 5-09.) A timber bulkhead shall be installed in the bulkhead recess in the turbine intake in the river wall."

Page 39—Detail Specifications

4-21. "*Patterns.*—(a) All special patterns required, including those for the roller gates and hoists, but excepting those for the lock gates provided for in (b) below, shall be furnished by the contractor and become the property of the United States. All of the patterns shall be well crated or boxed and delivered transportation charges prepaid, in first-class condition at the United States Repair Station, Marietta, Ohio, before final payment is made."

[fol. 1123] Page 44—Detailed Specifications

Par. 4-33. "*Measurement and Payment.*—All metal work except the roller gates with their fixed metal bearings, sill beams and plates and operating machinery, the metal in the walls, recess covers and roof of the operating houses, pipe hand-railing, crane track rails and connections on the service bridge, and any other metal parts for which provision for payment is made elsewhere in these specifications, will be paid for by the pound as classified on the drawings. The prices bid shall cover all necessary material and work for placing, fabricating, and painting the steel and iron shown on the drawings or called for in these specifications. Payments for sixty per cent of the unit price bid per pound will be made for all metal work when delivered and accepted at the site of the work, provided such material be stored and protected from corrosion in a manner satisfactory to the contracting officer. The remaining 40 per cent will be paid when the material is incorporated in the work

and accepted. When purchased and paid for by weight, no payment will be made for material in excess of the prescribed limit of variation from the calculated net weight of any piece. If any material so stored and partly paid for be not kept protected in a manner satisfactory to the contracting officer, no further partial payments on metal work as provided for in this paragraph will be made, and the material will be kept protected by the contracting officer at the expense of the contractor. All brass, copper and bronze not included with items for which lump sum prices are paid will be classified and paid for as bronze."

(NOTE.—Certain parts of the London contract from Section V, designated "Electrical materials, standard parts, tests and regulations" commencing with Paragraph 5–01, to the end of Section XII, designated "Power house machinery" ending with Paragraph 12–16 (b) are not contained in the Marmet contract.)

[fol. 1124] The Winfield Contract, dated October 24th, 1933, in the estimated amount of $1,921,130.00, is the same in all material respects as the foregoing London contract with the exception of the following notations:

Page 2 of the Contract

"This Contract, entered into this twenty-fourth day of October, 1933, by The United States of America, hereinafter called the Government, represented by the contracting officer executing this contract, and The Dravo Contracting Company, a corporation organized and existing under the laws of the State of Pennsylvania of the city of Pittsburgh in the State of Pennsylvania hereinafter called the contractor, witnesseth that the parties hereto do mutually agree as follows:

"Article 1. *Statement of work.*—The contractor shall furnish all labor and materials, and perform all work required for Constructing twin locks, a central control station on the river wall of Lock "A", and furnishing and installing the central control station machinery, two-haulage units, and lock illumination and signal light systems at the Winfield Lock and Dam, Kanawha River, Winfield, West Virginia, for the consideration of a sum based on designations and unit prices specified in schedule appended hereto."

Page 8 of the Contract—Alterations under Article 29

"Art. 29: *Alterations.*—The following changes were made in this contract before it was signed by the parties hereto * * *.

"Specifications

"* * *

[fol. 1125] "Page 117. The following specifications covering the Floating mooring bitts shall be included as paragraph 14–08:

"14–08. *Floating mooring bitts.*

"* * *

"(d) *Tests.*—The pontoons shall be shop tested for water-tightness as shall also the housings for the roller bearings in the yoke. Upon complete erection and installation in the field, each bitt shall be moved through its entire travel to assure that proper clearances throughout have been provided. In addition, the recesses in the land wall shall be checked for proper clearances in a similar manner either by use of one of the mooring bitts or with an accurately constructed template. Should any errors be detected, they shall be immediately corrected at the contractor's expense and a successful test completed.

"* * *

"Art. 30. *Approval.*—This contract shall be subject to the written approval of the Division Engineer, Upper Mississippi Valley Division, St. Louis, Missouri, and shall not be binding until so approved."

Page 1–2—General Specifications

"War Department

"Specifications for Constructing the Twin Locks and a Power House

Winfield Lock and Dam, Kanawha River

"General Specifications

"1. *Location.*—The site of the work contemplated herein is in the Kanawha River near the town of Winfield, West Virginia, about 27 miles below the City of Charleston, West Virginia, and 31 miles above the mouth of the river.

"2. *Work to be done.*—(a) *The work provided for herein has been recommended by the Chief of Engineers, U. S. Army, in House Document No. 31, 73d Congress, 1st Session, and is included in the approved program for public works under the National Industrial Recovery Act of 1933.*

"(b) The work to be performed under this contract will consist of furnishing all plant, labor, material and equipment for, and constructing or installing the following, complete and ready for operation, in accordance with these specifications and the drawings referred to in paragraph 3:

"(1) *Locks 'A' and 'B'*, twin 56-foot by 360-foot locks, [fol. 1126] complete with 4 miter gates, 8 gate-operating machines, 8 stoney gate valves, all necessary piping for hydraulic operation, and fuel-oil, gasoline, and water supply lines.

"(2) *Power House* of reinforced concrete. (See Sec. XI.)

"(3) *Power House Machinery,* including stand-by gasoline-electric power unit, pumps, pumping equipment for hydraulic operating machinery, air compressors, signal, and switchboard. (See Sec. XII.)

"(4) *Electrical Power Distribution System* complete for both locks, including illumination and signal system complete. (See Sec. XIII.)

"(5) *Miscellaneous Work,* as specified or indicated on the drawings, including the excavation and grading of the river bed and bank below the guide wall, filling and grading back of the land wall, and such incidental work as needed or ordered in writing by the contracting officer. (See Sec. XIV.)"

Page 69—Detail Specifications

7–08 "*Payment.*—Payment for the four sets of miter gates will be made at the contract lump-sum price each for "Lock Gates—Complete." The price bid shall cover all necessary material and work for furnishing, erecting, connecting complete, testing and painting, as indicated on the drawings or required in the specifications. In addition to the material in the gate proper, the price bid shall cover all metal work connected with the installation of gate such as the gate anchors, sill anchors and beam, embedded quoin

beams, and all castings and shall also include the gate walkways, handrailing and timber fenders. Estimate for 60 per cent of the contract price will be made when all the material has been delivered and accepted at the site of the work provided such material be stored and protected from corrosion in a manner satisfactory to the contracting officer. The remaining 40 per cent will be estimated when all material has been installed, connected complete, tested and accepted. If any material stored and partly paid for be not kept protected in a manner satisfactory to the contracting officer, no further payment on this item will be made and the material will be kept protected by the contracting officer at the expense of the contractor."

(NOTE.—The method of payment provided for in the above quoted paragraph is altered by Change Order No. 1 contained in Appendix A of the stipulation. See record, page 386.)

[fol. 1127] Page 71—Detail Specifications

(NOTE.—Paragraph 9-21 is the same as paragraph 9-21 of of the Detail Specifications of the London contract except that payment is provided for 8 gate operating machines instead of 4 and the method of payment is changed by Change Order No. 1, Appendix A of the Stipulation. See Record, page 386.)

Page 75—Detail Specifications

NOTE.—Paragraph 9-21 is the same as paragraph 9-21 of the Detail Specifications of the London contract except that payment is provided for 8 stoney gate valves instead of 2 and the method of payment is changed by Change Order No. 1, Appendix A of the Stipulation. See Record, page 386.)

Page 95—Detail Specifications

Dealing with "Gasoline-electric standby unit".

Paragraph 12-11 (h) "*Tests.*—Before shipment the unit shall be tested for satisfactory operation under the following conditions.

"(1) The engine *only* shall be run for two (2) hours at a speed to give ten per cent (10%) overload on dynamometer test.

"(2) The combined unit shall be run continuously for twenty-four (24) hours at full load.

"(3) Fuel consumption shall be determined for the combined unit at full load, three-fourths (¾) load, one-half (½) load and one-fourth (¼) load. (The fuel used shall be commercial standard gasoline, not high test.)

"(4) The valve setting and governor control shall be checked by means of a recording tachograph, with the combined unit operating under various loading conditions ranging from no load to full load.

"(5) The combined unit shall be tested by means of torsiographs for any evidence of critical speeds in torsional vibration, within a range of 40 r. p. m. above and 20 r. p. m. below normal operating speed. Evidence of destructive critical speeds within the above range will be cause for rejection.

[fol. 1128] "(6) Immediately after the tests, the contracting officer may require that the engine shall be opened up for inspection. Typewritten records of all of the above tests, including all observations, calculations, results, and graphs, all the above certified, shall be submitted to the contracting officer, in triplicate, as soon as practicable after completion of the tests. Final tests and trials shall be made after installation and shall be of sufficient duration to demonstrate to the satisfaction of the contracting officer that the complete unit is in conformity with the requirements of the specifications."

[fol. 1129] The Gallipolis contract, dated December 21st, 1933, for the estimated amount of $3,145,971.00, is the same in all material respects as the foregoing London contract with the exception of the following notations:

Page 2 of the Contract

"This Contract, entered into this twenty-first day of December, 1933, by The United States of America, hereinafter called the Government, represented by the contracting officer executing this contract, and The Dravo Contracting Company, a corporation organized and existing under the laws of the State of Pennsylvania of the City of Pittsburgh

in the State of Pennsylvania hereinafter called the contractor, witnesseth that the parties hereto do mutually agree as follows:

"Article 1. *Statement of work.*—The contractor shall furnish all labor and materials, and perform all work required for constructing two parallel locks, including guide and guard walls, gates and gate operating machinery, valves and valve operating machinery, and piping at the Gallipolis Lock and Dam, Ohio River, near Gallipolis, Ohio, for the consideration of a sum based on designations and unit prices specified in schedule appended hereto,"

Page 8 of the Contract

Article 29—Alterations

"Article 29. *Alterations.*—The following changes were made in this contract before it was signed by the parties hereto.

"* * *

"4. It is required that all parts of the work shall be [fol. 1130] prosecuted as vigorously as practicable during the winter months. With this in view, the following partial payments on items Nos. 15 to 22, inclusive, and 26 to 29, inclusive, will be made, in order that work on the fabrication of the lock gates, piping, gate operating machinery, and Tainter gate valves and operating machinery, may be started at once: Estimates of 30, per cent will be made on delivery of materials at the shop in which they will be fabricated, 30 per cent for fabrication, and the remaining 40 per cent when all the materials have been installed, tested, and accepted. Paragraphs in the specifications and addenda relative to the payment of the materi-ls involved are modified accordingly.

"The contractor will provide proper storage at his own yard and at his own expense for fabricated materials until time for delivery. If any of the materials, for which partial payments have been made, are not stored and protected in a manner satisfactory to the contracting officer, no further partial payments as provided above will be made, and the materi-ls will be kept protected by the contracting officer at the expense of the contractor.

"5. Paragraph 29 of the specifications is changed to read as follows:

"29. *Approval.*—This contract shall be subject to the written approval of the Division Engineer, Ohio River Division, Cincinnati, Ohio, and shall not be binding until so approved."

(NOTE.— Items Nos. 15 to 22, inclusive, and 26 to 29, inclusive, referred to in the first part of paragraph 4 above quoted, and the unit prices therefor are as follows:

Item No.	Designation	Quantities	Unit	Unit Price
15	Structural Steel and wrought iron..	4,150,000	pound	$.062
16	Nickel Steel	152,800	pound	.10
17	Steel Forgings	115,300	pound	.11
18	Steel Reinforcing.....	900,000	pound	.05
19	Castings—Iron, Steel and cast iron pipe	402,000	pound	.12
20	Bolts	20,000	pound	.18
21	Bronze	5,000	pound	.50
22	Babbitt	26,500	pound	.30
26	Pipe—for hydraulic system and water, gasoline and fuel oil supply line..	.....	sum	26,000.00
27	Hand Railing	.....	sum	1,300.00
28	Tainter Gate Valves—complete.....	6	each	8,500.00
29	Operating Machines—Lock Gates...	8	each	5,000.00)

[fol. 1131] Page 1—General Specifications

"War Department

"Specifications for Constructing the Two Parallel Locks, Gallipolis Lock and Dam, Ohio River

"Appropriation:—National Industrial Recovery, War—Rivers and Harbors, 1933-1935

"General Specifications

"1. *Location.*—The site of the work contemplated herein is in the Ohio River, about 9 miles below the City of Gallipolis, Ohio. The locks are located on the West Virginia bank of the river, about ¾ mile below Lock and Dam No. 26, Ohio River, Hogsett, W. Va.

"2. *Work to be done.*—(a) *The work provided for herein has been recommended by the Chief of Engineers, U. S. Army, in House Document No.* 31, *73d Congress, 1st Session, and is included in the approved program for public works under the National Industrial Recovery Act of* 1933.

"(b) The work to be performed under this contract will consist of furnishing all plant, labor, material and equip-

ment for, and constructing two parallel locks, including guide and guard walls, gates and gate operating machinery, valves and valve operating machinery, piping, all metal work noted on the drawings, and such incidental work as needed or ordered in writing by the contracting officer. The dimensions of the locks are 110 feet by 600 feet and 110 feet by 360 feet, respectively. The overall length of the main lock and guide walls is approximately 2158 feet."

Page 53—Detail Specifications

"Section VIII—Tainter Gate Valves

8-01. "*General.*—The contractor shall furnish, and completely install and connect the six Tainter gate valves including their operating machinery.

8-02. "*Materials and Workmanship.—Metal Work* shall be in conformity with the requirements of Section IV and as further specified below.

8-03. "*Valve Blade.*—

"(a) *Shop Erection.*—In order to detect any errors in [fol. 1132] the templates, the contractor shall erect at his works without charge at least one complete valve. Any error found during the erection shall be corrected in each valve.

"(b) *Final Erection.*—All parts shall be carefully made and fitted together so that after final assembly there will be no interference due to bad alignment or any warping or twisting in the members that would in any way interfere with smooth and satisfactory operation. Extreme care must be used in assembling the water seals. All sliding or bearing blocks which comprise the seals and the fixed metal in the valve pit on which they bear shall be accurately planed to insure close contact over their entire surface area. Provisions have been made for adjustment in the field of all such parts, but the contractor shall be responsible for the acequacy of provisions made for satisfactory erection. The wall castings for the trunnions and the bottom bearing castings shall not be grouted in until all seals have been carefully set and a trial lift of each valve made to demonstrate correct alignment of all parts throughout the

entire travel of the valve. Before beginning erection, the contractor shall submit for approval of the contracting officer, in triplicate, a detailed description of the methods he proposes for erection.

8-04. "*Trunnion Lubrication.*—Each trunnion pin shall be lubricated by means of a ½-inch alemite fitting set flush with the top of the lock wall. Connection shall be made to the trunnion by means of ½ inch extra strong brass pipe suitably anchored to the face of the valve pit and tapped into the trunnion pin. All screwed fittings shall be extra heavy brass.

8-05. "*Valve Operating Machinery.*

"(a) *Cylinders.*—The cylinders shall be bored straight and true to line and diameter, leaving a smooth working surface throughout the length of the cylinder.

"(b) *Packing.*—The flanged joints of cylinders shall be packed with oil proof sheet packing 3/32 inch thick, equal to Garlock Packing Company's 'Oiline" style 620. The stuffing boxes shall be packed with piston rod packings Nos. 261, 99, 550, 99, 550, 99, and 261 in the order named, and as shown and noted on sheet No. 25/16.

8-05. "(c) *Pistons.*—The pistons shall be assembled and made to fit the cylinders after boring.

"(d) *Assembling.*—Before shipment the cylinders, pistons, piston rods, heads and stuffing box glands shall be assembled.

"(e) *Frames for Cross Head Guide.*—The frames for the cross head guides shall be accurately fabricated and erected to insure proper alignment for the cross head guides.

"(f) *Bearings.*—The pedestal and pillow block bearings [fol. 1133] shall be accurately adjusted to line and grades for true alignment of the shafts for the drums.

8-06. "*Control Valves.*—The three-way valves shall be made and assembled in conformity with the details indicated on sheets Nos. 25/19, 25/20, 25/21. All materials and workmanship shall be such that when tested at 500 pounds per square inch pressure with hydraulic-jack oil, the valves

will show no leakage at plungers, gaskets or parts. Valves showing leakage will not be accepted."

Dated this the 24th day of December, 1936.

Homer A. Holt, W. Holt Wooddell, Counsel for Appellant. William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Appellee.

[fol. 1134] APPENDIX "Y" TO STIPULATION OF PARTS OF RECORD NECESSARY FOR CONSIDERATION OF CASE

[fol. 1135] It is stipulated by and between counsel for both plaintiff and defendant that plaintiff's Exhibit No. 8 filed with plaintiff's bill of complaint and designated as House of Representatives Document No. 31, 73d Congress, First Session, dealing with the lower part of the Kanawha River and the Ohio River where the dams at Winfield and Gallapopolis are located, is typical and similar in material respects to plaintiff's Exhibit No. 7, filed with plaintiff's bill of complaint and designated as House of Representatives Document No. 190, 70th Congress, First Session, dealing with the upper part of the Kanawha River where the dams at Marmet and London are located; and that in lieu of both of said Documents being printed as a part of the record, said House Document No. 31 shall be printed as a part of the record except certain parts deleted therefrom, and also certain insertions shall be printed, as follows:

1. Delete syllabus on page 4.
2. Delete paragraph 1 on page 4.
3. Delete paragraph 4 on page 5.
4. Delete, commencing with the heading "Preliminary examination of Kanawha River Lock No. 5 to mouth" on page 7 up to but not including the heading "Report of the District Engineer" on page 41.
5. Delete paragraph 4 on page 43.
6. Delete paragraph 12 on pages 46 and 47.
7. Delete paragraphs 15, 16, 17, 18, 19 and 20 on pages 48, 49 and 50.

[fol. 1136] 8. Delete tables commencing with "Calendar year 1925" on page 51, and ending with the table "Calendar year 1930", inclusive, on page 52.

9. Delete the remainder of paragraph 21, on page 52 commencing with the heading "Annual Totals".

10. Delete the table on pages 55 and 56 of Paragraph 25 commencing at the bottom of page 55 and ending at the top of page 56 and insert words in parentheses as follows: (Table omitted).

11. Delete paragraph 27 on page 57.

12. Delete paragraph 36 on pages 60 and 61.

13. Insert the following language in parentheses after the conclusion of paragraph 38 on page 62, namely: (NOTE.—Paragraphs 39 to 46, inclusive, dealing mainly with Plan No. 1, which was not adopted, are omitted.)

14. Delete paragraphs 39 to 46 inclusive, commencing on page 62 and ending on page 68.

15. Delete the remainder of Paragraph 48 on page 70 commencing with the words "The new pool will be at elevation 538".

16. Delete paragraph 49 on page 71.

17. Delete paragraph 50 on pages 71 and 72.

18. Delete paragraph 52 on page 73.

19. Delete paragraph 53 on pages 73 and 74.

20. Delete paragraph 55 on page 75.

21. Delete, commencing with the heading "Exhibits" on page 78 to the conclusion on page 85.

22. Delete the two maps attached thereto as exhibits.

[fol. 1137] Dated this the 24th day of December, 1936.

Homer A. Holt, W. Holt, Wooddell, Counsel for Appellant. William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counfor Appellee.

[fol. 1138] APPENDIX "Z" TO STIPULATION OF PARTS OF RECORD NECESSARY FOR CONSIDERATION OF CASE

[fol. 1139] It is stipulated and agreed between counsel for both plaintiff and defendant that in lieu of printing in the record in the Supreme Court of the United States all of "Appendix 'F' " filed with the stipulation in this case and designated as "License on navigable waters project No. 1175, West Virginia Kanawha Valley Power Company, issued January 16, 1934, by Federal Power Commission" the following in substitution, and in place of, shall be printed in the record:

"Whereas, by Act of Congress approved June 10, 1920 (41 Stat., 1063), designated therein as 'The Federal Water Power Act' and hereinafter called 'the Act,' the Federal Power Commission, hereinafter called 'the Commission,' is authorized and empowered, inter alia, to issue licenses for the purpose of constructing, operating, and maintaining dams, water conduits, reservoirs, power houses, transmission line, or other project works necessary or convenient for the development and improvement of navigation and for the depelopment, transmission, and utilization of power across, along, from, or in any of the navigable waters of the United States, or upon any part of the public lands and reservations of the United States (including the Territories), or for the purpose of utilizing the surplus water or water power from any Government dam; and

"Whereas, Kanawha Valley Power Company, hereinafter called 'the Licensee,' a corporation organized and existing under the laws of the State of West Virginia and having its office and principal place of business in the city of Charleston, in the State of West Virginia, has made application in due and proper form to the Commission for a license for a power project designated as Project No. 1175 on the records of the Commission, and for authority to construct, maintain and operate in Kanawha River, in the vicinity of London and Marget, in Kanawha and Fayette Counties, State of West Virginia, certain project works, as hereinafter described, necessary or convenient for the development and improvement of navigation and for the development, transmission and utilization of power across, along, from and in navigable waters of the United States; and upon reservations of the United States; and

"• • •

[fol. 1140] "Whereas, the maps, plans and specifications of said project and of said project works, as hereinafter described, have been approved by the Commission, and the plans of the structures affecting navigation have been approved by the Chief of Engineers and the Secretary of War; and

"Whereas, the Commission has found that said project, as hereinafter described, will be best adapted to a comprehensive scheme of improvement and utilization of said waterway for the purposes of navigation, of water power development and other beneficial public uses; and

"Whereas, the Commission did on the 15th day of January, 1934, find that the contemplated improvement is desirable and justified in the public interest for the purpose of improving or developing a waterway, namely, said Kanawha River for the use or benefit of interstate and foreign commerce, a certified copy of the records of the Commission containing such finding being hereto attached; and

"Whereas, the Licensee, on the 11th day of January, 1934, pursuant to an authorization of its board of directors, a copy of the record thereof being hereto attached, accepted in writing all the terms and conditions of the Act of this license;

"Now, Therefore, the Commission hereby issues this license to the Licensee for the purpose of constructing, operating and maintaining certain project works necessary or convenient for the development and improvement of navigation and for the development, transmission and utilization of power across, along, from or in said Kanawha River, navigable waters of the United States, and constituting a part of the project hereinafter described; said license, including the period thereof, being subject to all the terms and conditions of the Act and of the rules and regulations of the Commission pursuant thereto as amended and made effective on the 23rd day of June, 1930, as though fully set forth herein, which said rules and regulations are attached hereto and made a part hereof, and being subject also to the following express conditions and limitations, to wit:

"Article 1. This license is issued for a period of fifty (50) years from the date hereof, and in consideration of such license and the benefits and advantages accruing thereunder to the Licensee it is expressly agreed by the Licensee that the entire project, project area, and project works as hereinafter designated and described, whether or not located in, on or along said Kanawha River or upon lands of the United States, shall be subject to all the terms and conditions of this license, including the terms and condi- [fol. 1141] tions of the Act and of the rules and regulations of the Commission pursuant thereto and made a part of this license.

"Article 2. The project covered by and subject to this license is located at two (2) dams now under construction

by the United States near Marmet and London, and consists of—

"* * *

"Article 9. It is understood and agreed that this project is primarily for the development and improvement of navigation and further that in the construction of this project, the operations of the Licensee shall be coordinated by the Division Engineer, War Department, with the operations of the United States. Therefore, when construction is commenced by the Licensee, the Licensee will diligently prosecute the work in order to insure its completion within the time specified in Article 7 hereof. If at any time during the period of construction the work should not be prosecuted by the Licensee with such diligence as will insure its completion within the time specified in Article 7, the Chief of Engineers may so notify the Licensee in writing, stating in what respects the progress of the work is not satisfactory and what schedule of construction is in his opinion necessary properly to prosecute the work. If the Licensee should not, within ten (10) days after the mailing of such notification by the Chief of Engineers, convince the Chief of Engineers that it can and will carry out the schedule of construction so specified by the Chief of Engineers, the Chief of Engineers may thereupon terminate the Licensee's right to proceed with the work. In such event, the Chief of Engineers may take over the work and complete the structure in any manner he sees fit by contract or otherwise, and the Licensee shall be liable to the Government for any cost occasioned to the Government thereby. If the Licensee's right to proceed is so terminated, the Chief of Engineers may take possession of and utilize in completing the work such materials, appliances, and plant as may be on the site of the work and necessary therefor. On completion of such work or parts thereof as the Chief of Engineers may consider necessary to construct, and the payment in full therefor by the Licensee, the Licensee will be permitted to resume such construction as it may desire; provided, that the right of the Licensee to proceed shall not be terminated because of any delays in the completion of the work due to unforseeable causes beyond the control and without the fault or negligence of the Licensee, including, but not restricted to, acts of God, or of the public enemy, acts of the

Government, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather or delays of subcontractors due to such causes.

"Article 16. It is hereby understood and agreed that the United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of War, as may be necessary for the purposes of [fol. 1142] navigation. The operations of the Licensee so far as they affect the use and discharge of the water and the regulation of the elevations of all pools shall be controlled at all times by the Division Engineer, War Department, in charge of the improvement of the Kanawha River, pursuant to such reasonable rules and regulations as may be made from time to time by the Secretary of War in order to prevent any impairment of navigability. Subject to the foregoing paramount conditions, the Licensee shall so operate the power stations and utilize the pondage of the London pool between elevations 614 and 611 that it will make the most efficient use of the water power potentially available.

"Article 17. The Licensee shall furnish free of cost to the United States, electrical power at approximately 440 volts, 60 cycles, 3-phase alternating current, for the operation and lighting of the navigation facilities at both dams. The power required will not exceed a combined demand for the two dams of 500 kilowatts and an energy consumption in any month of 25,000 kilowatt-hours.

"• • •

"Article 19. If determined to be necessary by the Chief of Engineers for the protection of navigation, the Licensee shall, at its own expense, build a deflecting wall in the river below either or each dam, to deflect the current caused by the discharges from the power plants. The design, location, and time of construction of such deflecting wall, shall be subject to the approval of the Chief of Engineers.

"• • •

Article 23. "(b) The annual charge for recompensing the United States for the use of the Marmet Dam and appurtenant structures owned by the United States, and for the use, occupancy, and enjoyment of lands of the United States adjoining and pertaining to said Marmet Dam, shall be $32,000; and the corresponding annual charge for recompensing the United States for the use of the London Dam

and appurtenant structures owned by the United States, and for the use, occupancy, and enjoyment of lands of the United States adjoining and pertaining to said London Dam, shall also be $32,000; making a total annual charge of $64,000 for recompensing the United States for the use of the two Government dams and appurtenant works and of said lands of the United States: Provided, that such annual charges may be readjusted in the future, under the provisions of Section 10, subsection (e), of the Act; and provided further, that such annual charges are predicated upon the United States completing and maintaining the said Marmet and London navigation dam.

[fol. 1143] "* * *

"In Witness Whereof, the Federal Power Commission has caused its name and seal to be hereto signed and affixed by its Chairman, Frank R. McNinch, this 16th day of January, 1934, pursuant to an order of the Commission issued at its meeting on January 15, 1934.

Federal Power Commission, by Frank R. McNinch, Chairman.

Attest: Ralph R. Randell, Acting Secretary. (Seal.)"

Dated this the 24th day of December, 1936.

Homer A. Holt, W. Holt Wooddell, Counsel for Appellant. William S. Moorhead, Lawrence D. Blair, W. Chapman Revercomb, W. Elliott Nefflen, Counsel for Appellee.

[fol. 1144] [File endorsement omitted.]

Endorsed on cover: File No. 41,165. S. West Virginia, D. C. U. S. Term No. 625. Fred L. Fox, Individually and as State Tax Commissioner of the State of West Virginia, appellant, vs. The Dravo Contracting Company. Filed January 6, 1937. Term No. 625, O. T., 1936.

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IN THE

DISTRICT COURT OF THE UNITED STATES FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA

IN EQUITY.

No. 3492

THE DRAVO CONTRACTING COMPANY, A CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF THE STATE OF PENNSYLVANIA,

Plaintiff,

versus

FRED L. FOX, INDIVIDUALLY AND AS STATE TAX COMMISSIONER OF THE STATE OF WEST VIRGINIA,

Defendant.

Before NORTHCOTT, Circuit Judge, and WATKINS and McCLINTIC, District Judges.

AMENDED STATEMENT ON BEHALF OF DEFENDANT AS TO JURISDICTION OF SUPREME COURT OF THE UNITED STATES TO REVIEW DECREE UPON APPEAL.

In compliance with Rule 12 of the Rules of the Supreme Court of the United States, the defendant, Fred L. Fox, in his individual right and in his official capacity as State

Tax Commissioner of the State of West Virginia, submits his statement disclosing the basis upon which he contends that the Supreme Court of the United States has jurisdiction upon appeal to review the judgment and decree in the above-entitled cause:

A.

Statutory Provision Conferring Jurisdiction.

The statutory jurisdiction of the Supreme Court to review by direct appeal the judgment and decree here complained of is conferred by Judicial Code, Section 238, amended (Act of February 13, 1925, Chapter 229, Section 1, 43 Stat. 938; 28 U. S. C. A., Sec. 345), which provides:

> "A direct review by the Supreme Court of an interlocutory or final judgment or decree of a district court may be had where it is so provided in the following sections and not otherwise:"
>
> * * * * * * *
>
> "(3) Section 380 of this title."
>
> * * * * * * *

Section 380 of the Title (Judicial Code, Section 266, amended) referred to in the foregoing statute, reads (in part) as follows:

> "No interlocutory injunction suspending or restraining the enforcement, operation or execution of any statute of a state by restraining the action of any officer of such state in the enforcement or execution of such statute, or in the enforcement or execution of an order made by an administrative board or commission acting under and pursuant to the statutes of such state, shall be issued or granted by any justice of the Supreme Court, or by any District Court of the United States, or by any judge thereof, or by any circuit

judge acting as district judge, upon the ground of the unconstitutionality of such statute, unless the application for the same shall be presented to a justice of the Supreme Court of the United States, or to a circuit or district judge, and shall be heard and determined by three judges, of whom at least one shall be a justice of the Supreme Court or a circuit judge, and the other two may be either circuit or district judges, and unless a majority of said three judges shall concur in granting such application. * * * The requirement respecting the presence of three judges shall also apply to the final hearing in such suit in the district court; and a direct appeal to the Supreme Court may be taken from a final decree granting or denying a permanent injunction in such suit."

B.

State Statute the Validity of Which is Involved.

The statute of the State of West Virginia, the validity of which is involved, is Article 13 of Chapter 33, Acts of the Legislature of West Virginia, passed at the First Extraordinary Session of the Legislature of 1933, on May 26, 1933, in effect from passage, and published as Chapter 33 of the Official Acts of the West Virginia Legislature, First Extraordinary Session, 1933, pages 219-241, inclusive, and which amended Article 13 of Chapter 11 of the Official Code of West Virginia, 1931.

Said act, so far as here material, reads as follows:

AN ACT to provide for the raising of additional public revenue by amending and reenacting article thirteen, chapter eleven of the code of West Virginia, one thousand nine hundred thirty-one, relating to business and occupation taxes, by repealing all of sections one through seventeen, inclusive, and enacting and reenacting sections one through twenty-three, inclusive; and providing for and imposing a privilege tax upon the exercise of certain privileges in the state, by re-

pealing sections eighty-one through eighty-four, inclusive, article twelve, chapter eleven of said code; and enacting a new article to be designated article twelve-(a), chapter eleven of said code.

Be it enacted by the Legislature of West Virginia:

That sections one through seventeen, inclusive, article thirteen, chapter eleven of the code of West Virginia, one thousand nine hundred thirty-one, be and are hereby repealed and sections one through twenty-three, inclusive, be and are hereby enacted in lieu thereof; and that sections eighty-one through eighty-four, inclusive, article twelve, chapter eleven of said code be and are hereby repealed and article twelve-(a) be and is hereby enacted and added to chapter eleven.

SECTION 1. When used in this article, the term "person" or the term "company" herein used interchangeably, includes any individual, firm, copartnership, joint adventure, association, corporation, trust or any other group or combination acting as a unit, and the plural as well as the singular number, unless the intention to give a more limited meaning is disclosed by the context.

"Tax year" or "taxable year" means either the calendar year, or the taxpayer's fiscal year when permission is obtained from the tax commissioner to use same as the tax period in lieu of the calendar year.

"Sale" or "sales" includes the exchange of properties as well as the sale thereof for money, every closed transaction constituting a sale.

"Taxpayer" means any person liable for any tax hereunder.

"Gross income" means the gross receipts of the taxpayer received as compensation for personal services and the gross receipts of the taxpayer derived from trade, business, commerce or sales and the value proceeding or accuring from the sale of tangible property (real or personal), or service, or both, and all receipts by reason of the investment of the capital of the business engaged in, including interest, discount,

rentals, royalties, fees or other emoluments however designated and without any deductions on account of the cost of property sold, the cost of materials used, labor costs, taxes, royalties, interest or discount paid or any other expense whatsoever.

"Business," as used in this article, shall include all activities engaged in or caused to be engaged in with the object of gain or economic benefit either direct or indirect. The production of raw materials or manufactured products, which are used or consumed in the main business, shall be deemed business engaged in taxable in the class in which it falls.

"Gross proceeds of sales" means the value actually proceeding from the sale of tangible property without any deduction on account of the cost of property sold or expenses of any kind. The words "gross income" and "gross proceeds of sales" shall not be construed to include cash discounts allowed and taken on sales; the proceeds of sale of goods, wares or merchandise returned by customers when the sale price is refunded either in cash or by credit; or the sale price of any article accepted as part payment on any new article sold, if the full sale price of the new article is included in the "gross income" or "gross proceeds of sales."

"Service business or calling" shall include all non-professional activities engaged in for other persons for a consideration, which involve the rendering of a service as distinguished from the production or sale of tangible property, but shall not include the services rendered by an employee to his employer.

The classification of "wholesaler" or "jobber" shall apply only to a person doing a regularly organized jobbing business, known to the trade as such, selling to licensed retail merchants or jobbers, or to others in wholesale quantities and at wholesale prices.

SEC. 2. There is hereby levied and shall be collected annual privilege taxes against the persons on account of the business and other activities, and in the amounts